

JPRS 76713

28 October 1980

USSR Report

ENERGY

No. 35

FBIS

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ELECTRIC POWER

UDC 621.643.002.2

COAL SLURRY PIPELINE SCHEDULED IN NEXT FEW YEARS

Moscow STROTEL'STVO TRUBOPROVODOV in Russian No 5, 1980 p 22

[Unattributed article: "Pipeline for Hydraulic Transport of Coal"]

[Text] Construction and movement on-stream of the Belovo-Novosibirsk experimental-commercial coal slurry pipeline is scheduled in these next few years.

The general client and general designer of the pipeline is the USSR Ministry of Coal Industry, which has been assigned the designing and construction of facilities to prepare coal for transport in the form of a coal-water slurry, as well as operation of these facilities and the pipeline proper.

The Ministry of Construction of Petroleum and Gas Industry Enterprises is providing design and construction of the pipeline proper and pumping stations. The Soyuztransprogress Association has been given the job of manufacturing nonstandard equipment and building at the test facility at Ramenskoye a test bench for testing full-scale pumps and hydraulic fittings for mainline coal slurry transport systems.

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CSO: 8144/1649

UDC: 621.643+656/621.51

PIPELINE CAPSULE TRANSPORT OF VISCOSO OIL, PETROLEUM PRODUCTS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 5, 1980 pp 26-29

[Article by D. B. Ibragimov, V. A. Meliya, and F. A. Karimov of VNIIPI-transprogress; Yu. A. Bokerman and S. M. Vaysman, Kiev Affiliate of VNIIIST: "Pipeline Container Transport of Viscous Crudes and Refined Products"]

[Text] The oilfields of Western Siberia contain for the most part valuable high-viscosity crudes, production of which is steadily increasing. One basic difficulty involved in exploiting these reserves is the transport of such crudes under difficult climatic conditions, with permafrost and sharp seasonal temperature fluctuations.

The method of transmitting crude oil in a heated state, employed in the southern regions of this country, such as in the Uzen'-Kuibyshev pipeline, cannot be employed under these conditions, for a number of reasons which are specific to "hot" pipelines. High temperature differentials occur when heating crude, which require effective means and methods of insulation, which have not been sufficiently developed up to the present time. Under permafrost conditions there occur with "hot" transmission of crude ecological problems connected with subsoil thawing and irreversible changes in the subsoil temperature balance. More than 10 percent of the transported crude, which is a valuable chemical feedstock, is burned at heating stations sited along the route.

The elevated temperature of crude transport significantly accelerates the rate of pipe corrosion, which causes intensive wear and even rupture. In contrast to conventional crude oil pipelines, any halt to the pumping through of high-viscosity crudes results in rapid congealing of crude in the pipeline and puts the line out of operation for an extended period of time.

In addition to preheating, there are also other methods of preparing viscous crude for pipeline transmission: heat treatment, dilution with low-viscosity liquids or gases, aqueous solutions of surface-active substances, etc. These methods have not been extensively employed, for technical, process and, principally, economic reasons.

At the present time industry needs not only proposals for improving known methods of pipeline transport of viscous crudes but also fundamentally new technical solutions.

A team of scientists and experts from VNIIPtransprogress [expansion unknown] proposed a pipeline-capsule method of transporting such products. Development of a system applicable to the conditions of the Tyumen' Oil and Gas Region is in progress, working jointly with Giprotyumenneftegaz, the Siberian Scientific Research Institute of the Petroleum Industry, and the Kiev Affiliate of the All-Union Scientific Research Institute for Construction of Trunk Pipelines.

The potential utilization of trunk pipeline continuous-capsule systems (MTPKS) is dictated by their reliability, high capacity, and economy.

A comparative analysis of technical-economic substantiations (TEO) of a number of proposed systems for transporting high-viscosity crudes from the Russkoye oilfield revealed the advantages of MTPKS.

With utilization of MTPKS, a stream of interconnected capsules moves at a constant velocity within a transport pipeline, along the entire length of the line. This stream of capsules is powered by stationary propulsion devices (for example, electromagnetic) built into the pipeline at specified intervals and working in coordination with the capsule propulsion components. To ensure guaranteed tension and for performing preventive maintenance without shutting down the system, there is a gap on the pipeline, within which individual units are separated from the continuous hookup and removed to a preventive maintenance station (RPS), with repaired units simultaneously reinserted into the line. Figure 1 contains a schematic diagram of the MTPKS.

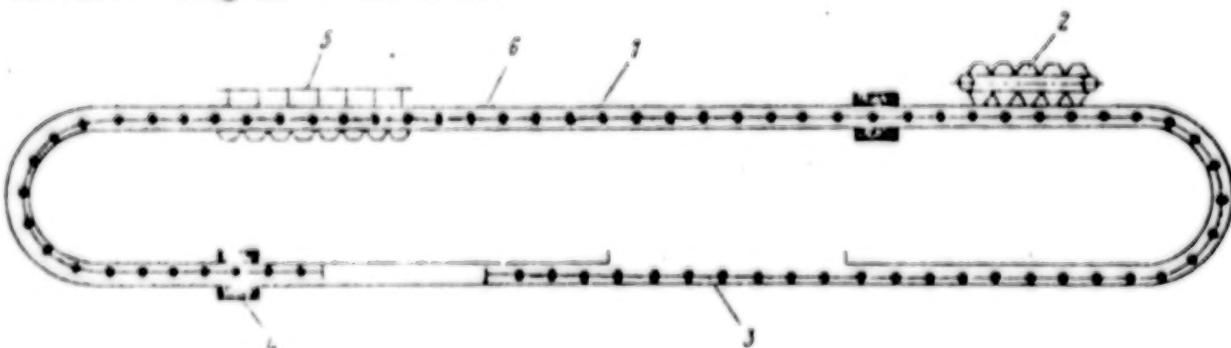


Figure 1. Schematic Diagram of Pipeline Continuous-Capsule System

In addition to transporting crude oil and refined products, an MTPKS can transport by the return leg liquid, bulk and construction materials needed in the oilfield area.

Charging and discharging are basic MTPKS subsystems, which provide continuous feeding of transported materials.

For the transport of high-viscosity crudes and refined products, it is necessary to develop totally new charging-discharging units, which ensure requisite system capacity. Let us first examine the mechanism of solidification of crude oil in capsules. We shall employ an approximate model of this process developed by Academician L. S. Leybenzon.

Region $b \leq r \leq R$ will be in a solid state, and region $0 \leq r \leq b$ will be in a liquid state. Here R is the radius of the cylinder (capsule); b -- traveling radius of phase boundary. We shall introduce the following symbols: T_0 -- initial temperature of the crude oil; T_{nos} -- temperature on the capsule surface; T_{rp} -- temperature at the phase boundary (in this instance -- crude oil solidification point; $T_{rp} = T_1$).

It is assumed that $T_{\text{nos}} \leq T_{rp} \leq T_0$.

A thermal conductivity equation can be written for the region $b \leq r \leq R$:

$$\frac{\partial^2 u_1}{\partial r^2} + \frac{1}{r} \frac{\partial u_1}{\partial r} - \frac{1}{a_1} \frac{\partial u}{\partial t} \quad (1)$$

with boundary conditions $u_1 = T_{\text{nos}}$ with $r = R$, $u_1 = T_{rp}$ with $r = b$, (2)

where t -- time; r -- current radius of cylinder; $u_1(r, t)$ -- temperature of solid phase; a_1 -- coefficient of solid phase thermal conductivity.

For the region $0 \leq r \leq b$ it is assumed that initial temperature T_0 is equal to solidification point T_{rp} and is constant throughout the entire volume

$$u_2 = T_0 = T_{rp} = \text{const}, \quad (3)$$

where $u_2(r, t)$ -- temperature of liquid phase.

At the boundary of solidification (when $r = b$), there occurs the condition of Stefan's phase conjugation

$$K\rho_{\text{L}} \frac{db}{dt} = \lambda_{\text{TB}} \frac{\partial u_1}{\partial r} - \lambda_{\text{L}} \frac{\partial u_2}{\partial r}, \quad (4)$$

where K -- crude oil latent heat of fusion; ρ_{L} -- density of the liquid phase; λ , λ_{TB} -- coefficients of thermal conductivity of the liquid and solid phases respectively.

The initial condition for equation (4) will be

$$b/t=0=R \quad (5)$$

In the assumption of steady-state temperature conditions (that is, $\partial u/\partial t=0$), we obtained a cylinder solidification curve

$$t = \frac{K\rho_m R^2}{2\lambda_{TB} (T_{rp} - T_{nos})} \left\{ \frac{1}{2} \left[1 - \left(\frac{b}{R} \right)^2 \right] - \left(\frac{b}{R} \right)^2 \ln \frac{R}{b} \right\}. \quad (6)$$

We shall obtain complete solidification time ($b=0$) as a particular case of equation (6)

$$t_{\max} = \frac{K\rho_m R^2}{4\lambda_{TB} (T_{rp} - T_{nos})}. \quad (7)$$

As an example we shall perform calculations with formula (6) for plotting solidification curves for crude oil in a 315 mm capsule (350 mm diameter pipeline), at various ambient temperatures (Figure 2).

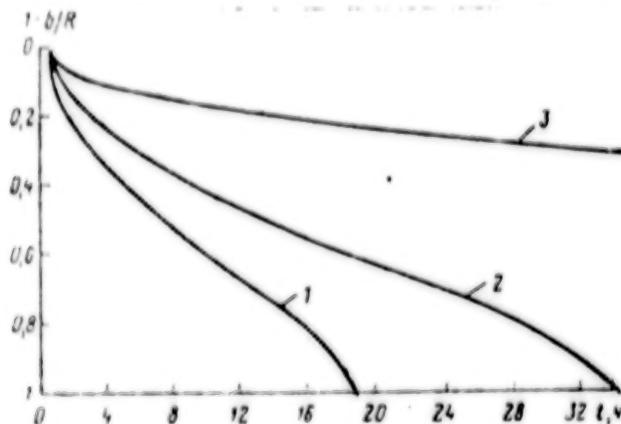


Figure 2. Relationship Between Degree of Solidification of Crude Oil and Time: 1 -- 10°C; 2 -- 20°C; 3 -- 30°C

In our calculations we employed the physical properties of viscous crude oil from the Uzenskoye field: $T_{rp} = +32^\circ\text{C}$; $K = 11 \text{ kcal/kg}$; $\lambda_{TB} = 0.138 \text{ kcal/m}\cdot\text{h}\cdot^\circ\text{C}$; $\rho_m = 833 \text{ kg/m}^3$.

The curves show that with limited transport time and sufficiently high T_{nos} , only the outer layer of crude oil solidifies.

According to condition (3) of the adopted model, at the initial moment the entire original volume has a solidification point of $T_{rp} = 32^\circ\text{C}$. In practice crude oil is poured into the capsule at a higher temperature -- $T_0 = 50-70^\circ\text{C}$. The period of time during which the crude oil cools from temperature T_0 to T_{rp} , "postpones" initiation of solidification and thus decreases the oil solidification layer.

Curves were plotted (Figure 3) to estimate cooling time from T_0 to T_{rp} with the same input data on the basis of calculations of convection in a confined space taking into account gradual change in physical properties of crude oil with a decrease in temperature. The coefficient of heat transfer from the capsule surface to the surrounding medium was determined on the basis of known ratios for convection during pipe longitudinal flow.

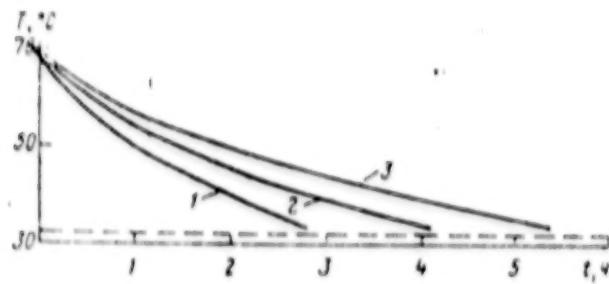


Figure 3. Relationship Between Crude Oil Cooling Temperature and Time:
1-3 -- same as in Figure 2

Thus with specified initial and terminal conditions and known geometric capsule dimensions, one can determine from the graphs in Figure 2 the degree of crude oil solidification (thickness of outer layer) during transport.

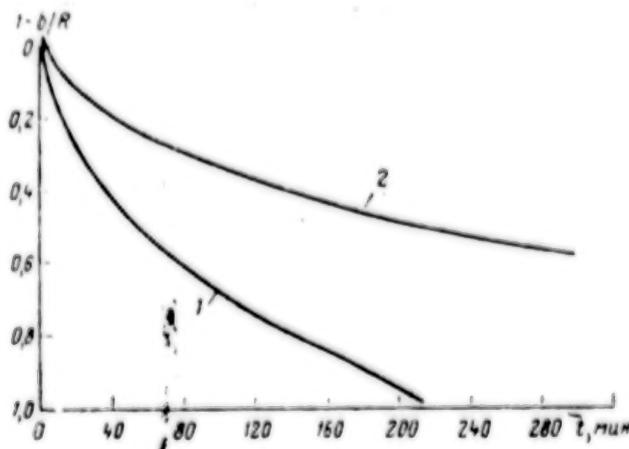


Figure 4. Relationship Between Degree of Crude Oil Liquefaction and Time:
1 -- 300°C; 2 -- 100°C ($T_0=20^\circ\text{C}$)

Let us examine the possibilities of calculating liquefaction of a specified volume of crude oil with capsule immersion in a medium with specified temperature T_{med} . In this instance

$$T_0 \leq T_{rp} \leq T_{\text{med}} \leq T_{\text{sat}}$$

In spite of change in the direction of heat flow, the type of phase conjugation equation (4) remains the same.

For the region $0 \leq r \leq b$ thermal conductivity equation (1) can be written with boundary conditions $u_1(r, t) = T_{rp}$ with $r = b$

$$\frac{\partial u_1}{\partial r} = 0 \quad \text{with } r=0, \quad (8)$$

and initial condition $u_1(r, t) = T_0$ with $t = 0$. (9)

Problem (1), (8), (9) can be solved with the employment of a Laplace time transform.

In view of the laboriousness of the proposed calculations, we shall take as a first approximation

$$\left. \frac{\partial u_1}{\partial r} \right|_{r=b} = \frac{T_{rp} - T_0}{b}. \quad (10)$$

For the region $b \leq r \leq R$

$$\left. \frac{\partial u_2}{\partial r} \right|_{r=b} = \frac{T_{soe} - T_{rp}}{R - b}. \quad (11)$$

Integration of equation (4) taking into account expressions (10) and (11), with initial condition (5), gives the following cylinder liquefaction curve equation:

$$t = \frac{K\rho_{rp}R^3}{A + B} \left\{ \frac{B}{A + B} \left[1 - \frac{b}{R} + \right. \right. \\ \left. \left. + \frac{A}{A + B} \ln \frac{B}{(A + B) \frac{b}{R} - A} - \frac{1}{2} \left[1 - \left(\frac{b}{R} \right)^2 \right] \right] \right\}, \quad (12)$$

where

$$A = \lambda_{1s}(T_{rp} - T_0), \\ B = \lambda_{so}(T_{soe} - T_{rp}).$$

In a particular case, cylinder complete liquefaction time (when $b=0$) will have the form

$$t = \frac{K\rho_{rp}R^3}{A + B} \left\{ \frac{B}{A + B} \left[1 + \frac{A}{A + B} \ln \left| \frac{B}{A} \right| \right] \right\}. \quad (13)$$

The graphs in Figure 4 have been plotted as a result of calculations with formula (13).

An analysis of the graphs shows that complete liquefaction time, even with a heating medium temperature $T_{soe} = 300^\circ\text{C}$ is too great and, consequently, if during transport time the entire volume of crude oil in the capsule solidifies, heating from the surface is ineffective as a means of ensuring pouring. It is necessary either to seek qualitatively different modes of emptying containers, such as scouring with streams of heated crude oil, driving out with compressed oil or gas, change in capsule design, or one must obtain the possibility of substantially increasing heating time.

As indicated earlier, however, under certain conditions only the surface layer of crude in the capsule solidifies. In this case heating from the surface may prove sufficiently effective and economical.

The proposed method was utilized in elaboration of technical-economic substantiation of a continuous-capsule system designed for transporting viscous crudes from the Russkoye oilfield a distance of 150 km.

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ENERGY CONSERVATION

NEW SOVIET STATE GAS SUPERVISION AGENCY

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 8, Aug 80 pp 20-22

[Interview with A. S. Voytenko, chief of the Administration for State Gas Supervision in the USSR: "For a Strengthening of Supervision Over the Utilization of Gas in the National Economy"]

[Text] With the increase in the scale of our national economy, our need for fuel and energy continues to grow at an uninterrupted pace. In connection with this, our gas industry--an important component of the USSR fuel-energy complex--is expanding at high tempo. However, the increase in the gas extraction is but one of the factors for the reliable satisfaction of the national economy's need for gas. No less important a factor is the careful and rational expenditure of this most valuable raw material and fuel.

The 25th Party Congress set forth the task of a further improvement in our system for the standardization, accounting, and expenditure of fuel and energy, for a strengthening of supervision over their utilization, and for combating any manifestation of squandering and mismanagement.

That is why, therefore, a governmental decree on the increased role to be played by the Ministry of the Gas Industry in the carrying out of state gas supervision in the USSR was so opportune.

A correspondent of our journal, "Gazovaya Promyshlennost'", contacted A. S. Voytenko, Chief of the Administration for State Gas Supervision in the USSR, with a request to reply to a number of questions of interest to our readers.

[Question] Aleksandr Sergeyevich, can you tell me please what motivated this change in existing legislation on the utilization of gas?

[Answer] The rights, obligations and functions of state agencies which carried out supervision over the rational and effective utilization of natural gas in accordance with earlier legislation were not defined adequately enough. Now they have been corrected and strengthened by corresponding rights. In addition to this, there is a sharp increase in the role to be played by the Ministry of the Gas Industry with respect to control over the utilization of natural gas in all branches of our national economy. The ministry has been entrusted with the task of seeing to the rational expenditure of gas within the nation, for which purpose the necessary measures have been worked out.

[Question] What are the new obligations which have been entrusted to the Ministry of the Gas Industry in regard to control over the use of gas and what are the rights which have been given the ministry?

[Answer] In conformity with the new legislation, a whole series of new obligations have been placed upon the ministry. Among them are:

The exercising of state supervision in overseeing the work of construction-installation organizations which are erecting for the Ministry of the Gas Industry installations for the extraction, transportation and storage of gas, in setting the norms and rules used in construction of these installations which pertain to the reliability and the safety of their operation, as well as over fulfillment of rules for the protection of trunk pipelines by enterprises, associations, institutions and organizations which are carrying out work in areas transited by those pipelines;

The working out (with the participation of ministries and governmental departments involved) and the approval of a single set of rules for the utilization of gas in the national economy.

In order to see to the rational and effective utilization of gas in the national economy, the Ministry of the Gas Industry has been granted broad rights. In particular, they include the right to:

Place before Gosplan USSR conclusions as to questions of the approval of gas as the basic type of fuel for enterprises being built, expanded and reconstructed or for individual installations which use gas, and as to the need for establishing reserve types of fuel for them;

Grant permission for the use of new gas consumption equipment in the reconstruction of the technical re-equipment of enterprises using gas and of individual installations which use gas;

Place before corresponding planning agencies of ministries and governmental departments proposals for expansion of production of progressive types of equipment which use gas and which would bring about a decrease in norms for gas expenditure;

Verify, together with the USSR State Committee for Standards, the correlation between manufactured equipment which uses gas and requirements for the rational and effective utilization of gas;

Require of ministries and governmental departments involved removal from production of uneconomic gas-consuming equipment;

Change, for the purpose of facilitating normal gas supply to the population and of averting disruption of the technological regimen of main gas pipelines, standards for the daily supply of gas to gas-consuming enterprises, associations, institutions and organizations, this after giving them preliminary warning without fail of an intention to do so.

Review schedules submitted to the councils of ministers of union and autonomous republics, to the executive committees of kray, oblast and of the Moscow and Leningrad city soviets of workers' deputies involving the supply of gas to consumers and priorities for cutting them off from gas-supply networks in the event of a disruption in the technological regimen of the work of main gas pipelines as the result of accidents, as well as schedules for shifting gas-consuming enterprises, institutions and organizations to reserve types of fuel in the event of a significant drop in temperature;

Enlist the services, with the cooperation of the ministries and governmental departments to which they are subordinate, of scientific research, design, planning and design, and technological organizations in the working out of standards and rules for the utilization of gas;

Generalize and disseminate positive experience of gas-consuming enterprises, associations, institutions and organizations as to the conservation of gas, as well as raise questions before ministries and governmental departments as to the elimination of shortcomings in the use of gas.

[Question] Aleksandr Sergeyevich, it is evident then that agencies of state gas supervision will play quite an important role in the resolution of all these tasks?

[Answer] In connection with the Gas Industry Ministry's being charged with functions as to the strengthening of supervision over the rational and effective use of gas in the national economy, the role of gas supervision agencies has become more significant, naturally. Thus, representatives of these agencies are to be included without fail on state acceptance commissions for placement into operation of installations controlled by the state gas supervision administration.

For this reason, the Administration for State Gas Supervision in the USSR of the Ministry of the Gas Industry is to be reorganized into the Main Administration for State Gas Supervision in the USSR (Glavgospaznadzor USSR), with an expansion of its rights.

In addition, questions involving the material stimulation of the more outstanding workers of rayon inspectorates have been resolved.

Previously, agencies of the state gas supervision administration did not have the right to apply measures of administrative sanction to officials guilty of squandering gas. Now, through a special Uzase of the USSR Supreme Soviet Presidium, officials are being made administratively responsible in the form of either a warning or a fine of up to 100 rubles for specific violation of the norms and rules for the utilization of gas. Measures of administrative sanction called for by this Uzase are to be applied by administrative commissions under the executive committees of rayon, city, and city rayon soviets of workers' deputies upon the submission of complaints by authorized officials of agencies of state gas supervision. A new set of regulations on state gas supervision in the USSR was approved at the same time.

[Question] What distinguishes the new regulations from those which were in effect previously?

[Answer] The new regulations set out in greater detail the tasks, functions and rights of control in the field of supervision over the rational utilization of gas in the national economy. These seek to facilitate an increase in state discipline as to the consumption of gas as well as the reliability and safety of operation of installations involved in the extraction, transport and storage of gas.

Previous regulations, moreover, had state gas supervision agencies exercising control over the rational and effective utilization of gas only as fuel and only when it was consumed by industry. In accordance with the new regulations, state gas supervision has been entrusted with the task of controlling the utilization of gas not only as fuel but as raw material also. Now also all gas-consuming enterprises, associations, institutions and organizations have been placed under the supervision of state gas supervision agencies regardless of their departmental subordination and established equipment capacities. As a consequence of this, the number of enterprises under the control of state gas supervision agencies has increased from 22,000 to 140,000-150,000.

The new structure of state gas supervision agencies calls for gas supervision within the nation to be exercised by the Main Administration for State gas Supervision in the USSR under the Ministry of the Gas Industry and by the local agencies subordinate to it--territorial inspectorates (divisions) for supervision over the utilization of gas in the national economy and by rayon inspectorates for supervision over the construction and exploitation of installations for the extraction, transport and storage of gas.

In accordance with the duties of his job, the head of the Main Administration for State Gas Supervision in the USSR is, at the same time, the Chief State

Inspector for Gas Supervision in the USSR, while his deputies are also deputy chief state inspectors.

[Question] Could you, Aleksandr Sergeyevich, give us the specific basic tasks of the USSR State Gas Supervision administration?

[Answer] The basic tasks of state gas supervision can be boiled down to effective control:

Over the rational utilization of gas as a fuel and as a raw material at enterprises, within associations, and at institutions and organizations regardless of their departmental subordination; over the utilization by gas-consuming enterprises of the gas funds allocated to them and observation of the regimens established for their consumption of gas; over observation of procedures for the release of gas to consumers; over the preparedness of gas-consuming enterprises for work with the reserve types of fuel established for them; over the technical level and the condition of gas-consuming devices and equipment so as to facilitate their rational and effective use of gas; and over introduction into the national economy of new equipment in the field of gas utilization;

Over construction-installation organizations which are erecting for the Ministry of the Gas Industry gas-collection and gas-distribution networks (from the mouths of wells) at gas fields, field gas collection points, installations for the processing of gas, headwork for main gas pipelines and for gas extraction compressor stations, main gas pipelines, gas compressor and gas distribution stations, underground gas storage stations, gas condensate pipelines, as well as interconnecting bases, gas-filling stations and pipelines for compressed hydrocarbon gas (to be referred to as "gas installations" henceforth), norms and rules applicable to the construction of the installations indicated, particularly as they apply to facilitating the reliability and safety of operation of these installations; the fulfillment by enterprises, associations, institutions and organizations doing their work in areas intersected by main pipelines being operated by the Ministry of the Gas Industry of the requirements of rules for the protection of those main pipelines.

State gas supervision agencies:

Are to provide, in accordance with established procedure, permission for the release of gas to gas-consuming devices;

Are to take part in the work of state commissions for the acceptance and placement into operation of installations under their control;

Are to participate in the working out of proposals approved by the councils of ministers of union- and autonomous republics, by the executive committees of kray, oblast and Moscow and Leningrad city soviets of workers' deputies and presented to the Ministry of the Gas Industry for the

coordination of schedules for the transfer of gas-consuming enterprises to reserve types of fuel in the event of a significant drop in temperature, and are to supervise fulfillment of those schedules;

Are to provide their opinions in regard to draft projects as to standards and technical specifications for gas-consuming equipment, particularly those touching upon the facilitating of the rational and effective utilization of gas by that equipment; they are to do the same in regard to draft projects as to standards and technical specifications for material and equipment used in the construction of gas installations, particularly those affecting the facilitating of the reliability and safety of the operation of those installations;

Are to provide their opinions in regard to norms and rules worked out by ministries and governmental departments which are to be applied in the design, construction and operation of gas installations and gas-consuming devices;

Are to take part in the work of commissions for the investigation of destruction resulting from the testing of installations under construction and are to keep a register of such accidents.

[Question] What rights have been given the Chief State Inspector for Gas Supervision in the USSR and his deputies?

[Answer] In conformity with their competency, broad rights have been granted to the Chief State Inspector and his deputies and to senior state inspectors and state inspectors for gas supervision. In particular, they are entitled to:

Investigate without hindrance and at any time of the day or night any enterprise which uses gas (with the exception of those gas-consuming enterprises and devices which are being operated in accordance with special rules), as well as any gas installations which are under construction;

Submit to construction-installation organizations which are erecting gas installations obligatory instructions to eliminate violations of norms and rules used in the construction of such installations, particularly those which apply to the reliability and safety of their operation. They may also halt work on gas installations under construction in the event that these norms and rules are violated, if such violations result in a decrease in the reliability and safety of the operation of gas installations.

Decisions to halt work are to remain in effect until the violations which were the basis for the action are eliminated.

The Chief State Inspector for Gas Supervision in the USSR and his deputies have been granted the right to make decisions halting the supply of gas to gas-consuming devices in the event that gas has been released to them without the authorization of the state gas inspectorate. They may also do so when it is necessary to eliminate the following violations:

The exceeding of allotted gas funds or failure to observe established rules for the expenditure of gas;

The use of gas by gas-consuming devices without norms for gas expenditure having been previously approved, or in the event those norms have been exceeded;

The operation of gas-consuming devices without any record being kept of the expenditure of gas or heat energy and of production resulting from the use of gas; the lack of (or the malfunctioning) of equipment for the automatic regulation of gas-burning processes, devices for thermotechnical control or thermal insulation equipment called for in draft plans for gas-consuming devices;

Unpreparedness for the use of the particular reserve fuel system called for at a gas-consuming enterprise or the unpreparedness of gas-consumption equipment for operation using the reserve type of fuel established for it;

Use by gas-consuming enterprises of basic and reserve types of fuel which do not correspond to the type of fuel established for them.

The expert use by state gas inspection agencies of the Rights which have been granted to them, the correct application of fines and other sanctions against officials guilty of squandering and mismanagement in the expenditure of natural gas will save the state hundreds of millions of cubic meters of this valuable raw material and fuel.



Aleksandr Sergeyevich Voytenko, Chief
USSR Administration for State Gas Supervision

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ENERGY CONSERVATION

INDUSTRIAL BRANCHES CALLED TO MAKE ENERGY CONSUMPTION COST EFFECTIVE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 21 Aug 80 p 4

[Article by N. Sveshnikov, senior engineer of the Irkutsk All-Union Timber Industry Association: "Kilowatts in Abeyance"]

[Text] Consumers and producers of fuel-energy resources can be divided, roughly, into two large groups. To the first group belong the energy consuming branches of the national economy in which the cost of production expenditures for fuel, electricity and heat takes a large proportional share and in which conservation is one of the most decisive factors for deriving above-plan profits. United into the second group are enterprises of those industrial branches for whom the production and consumption of fuel-energy resources does not have a substantive effect upon the cost of production. Our "Irkutsklesprom" All-Union Association belongs to the latter.

Within associations the idea has become ingrained that organizations such as the Ministry of Power, Gosplan and Gosnab USSR should deal with the problems of conservation for they were ordained to concern themselves with this. Strictly speaking, there is no objection one could make to that if it were not for this one, not unimportant circumstance: the fact that "Irkutsklesprom" itself produces fuel-energy resources and quite a bit of it. Out of the overall volume of these resources which were expended, let us say, last year, the association was able to produce, through its own efforts, 12.5 percent of the electricity, 86 percent of the heat, and 81 percent of the fuel.

Let us examine what is hidden behind those figures. The association produced and utilized as fuel 2.2 million cubic meters of timber which, for one reason or another, were transformed into firewood, plus 285,000 cubic meters of technological woodchips, a most valuable raw material for paper-pulp and hydrolysis production, which were consumed in the furnaces of boilers. Also produced were 256 million kWh of electricity and 1.1 million gigacalories of heat. This also was not cheap to produce.

It cannot be said that the Ministry of the Timber and Wood Processing Industry USSR is unaware of this and that it is not making any effort to stop these losses. Sent out from the ministry in just 1 year alone, this to department subunits and to our association also, were 12 orders and sets of instructions which prescribed a stiffening of conservation procedures and a strengthening of the struggle against bad management in the expenditure of resources. Alas, the effectiveness of these was insignificant. Almost all of the ministry's instructions remained on paper because there was simply no one to place them into effect.

Take, for example, the Tayshet Timber Industry Association. There are, within its power network, 43 diesel electric power stations, more than 80 power transformers, 69 hot-water boilers and a multitude of other equipment. All of these are managed by one man--a power engineer who is subordinate to the chief mechanic. Can one, in all seriousness, hold him responsible for the conservation of resources?

It seems to me that what we need, both at enterprises and within associations, is not only a power service but a power supervision inspectorate. Moreover, its status should not be that of an auxiliary but rather that of an independent subunit subordinate to the State Inspectorate for Power Engineering Control.

Apparently, there is some sense in placing among the evaluation indicators, the volumes of fuel-energy resources produced through one's own efforts and of the consumption of those resources. One should not reconcile oneself to the fact that a considerable part of these resources is not taken into account on the state level. For if there is no accounting being made of it, then, understandably, there can be no request for its economic expenditure.

Another problem connected with economy and thrift are the shortcomings of design work. For it is precisely at this stage that the most basic premises for the future loss of fuel-energy resources arise. This is how it happens.

Within the energy-consuming industrial branches, as within the Ministry of Power for example, in the construction of new enterprises and in the reconstruction and technical reequipping of old enterprises. This rule is always strictly followed: the newest achievements of science and engineering are to be included in the design work. Instead, within the Ministry of the Timber and Wood Processing Industry and other ministries, who are the leaders as to those industrial branches which do not consume a great deal of energy, progress has been slowed down almost to the point of stagnation. All this occurs because this matter is handled by the industrial branch's scientific and design institutes and design bureaus, whose main obligation is the improvement of basic production so that there is an increase in production output and an improvement in its

quality. Where is there even time to think about enterprise energetics when it is considered to be part of the auxiliary services? That is why project decisions also are adopted without any consideration of the rational utilization of fuel-energy resources. For there are no specialists at those institutes on whom responsibility could be placed for progress in industrial branch energetics. If there are any such specialists, they possess neither sufficient rights nor opportunities.

In confirmation of this, I will cite examples from our industrial branch, although I am certain that these can also be found in many other branches. In its time, the Ministry of the Timber and Wood Processing Industry banned strictly the construction of low-capacity boilers. Well, what about it? The "Giprotdrev" Institute, the main designer of the Lenogorsk Timber and Wood Processing Combine, sought to tie in the 12 very small boilers which served the enterprise and its settlement with yet another such settlement, a light-handed creation of the "Soyuzlespromprojekt" association. It is good that Stroybank turned down the proposal, it having correctly discerned in the activity of the designers an intention to deviate from the technical policy aimed at increasing the individual capacity of power equipment.

Another ministerial order called for construction in Siberia, this for plywood, flooring, furniture and woodworking plants, of boiler facilities which can also utilize timber working waste products as additional fuel. Our production people, with the blessing of our design workers, in violating this order continue to expand boilers which also burn timber. It has long been clear to everyone that wood waste products are not sufficient and that valuable raw material such as woodchips and sawdust have to be burned also.

Yet another characteristic shortcoming in draft plans for the construction, reconstruction and technical reequipment of our basic production is technology which consumes a lot of energy and which is uneconomic. There is no one to see to it that these draft plans meet requirements for the rational utilization of fuel, electricity and heat energy. Yet, divisions for the repair and operational servicing of heat and power devices, particularly for their material-technical provision, are not given an opportunity to review those draft plans. It is because of this that the level of servicing heat and power devices within the "Irkutsklesprom" Association has not improved over the past decade even though the amount of these devices has tripled. The ever-increasing loss of energy resources stems from this.

Evidently the time has come to restructure the work of scientific research and design institutes and of design-technological bureaus. It should begin with the creation of departments of experts within them, departments which would handle the analysis of draft plans from the point of view of the rational utilization of fuel and energy and of their conservation.

Industrial branch institutes should be charged with the responsibility for working out and using in these draft plans progressive norms for the expenditure of energy resources for individual types of products and for large technological processes. It will probably not involve a great deal of work to accomplish this, inasmuch as there is the experience of other industrial branches to draw on. It goes without saying that divisions for the repair and technical servicing and for the material-technical provision of enterprise power equipment should participate in the working out of these draft plans.

Right now, on the threshold of the 11th Five-Year Plan, when we are in the process of working out new plans for economic and social development, we should take into consideration all reserves for increasing the effectiveness and quality of work. This includes those reserves which are now hidden in our industrial branch energetics.

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CSO: 1822

ENERGY CONSERVATION

NEW ECONOMIC CRITERIA FOR SELECTING OIL FIELDS TO BE DEVELOPED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Aug 80 p 2

[Article by A. Sharay, deputy chief of the Economic Planning Administration Under the USSR Ministry of the Petroleum Industry: "Economics of the Oil-Bearing Stratum"]

[Text] The nation's petroleum industry is confidently continuing its ever-increasing tempo. Hundreds of sites, on which many thousands of wells have been drilled, have been opened and are being worked in dozens of oil regions located on the territory of the USSR. At each site, every oil well has its own geographic, mining-geological, technical, technological and other features which result in various levels of expenditure for the extraction of oil.

Some are located in populated areas and require a minimal volume of capital investment for their exploitation. Others are to be found in areas which are difficult to reach and which are remote from industrial centers. Such sites compel us to create anew the corresponding infrastructure. Naturally, everything else being equal, our expenditures per ton of oil extracted will be considerably higher in this case.

Even within the bounds of the same oil deposit wells often vary greatly as to their productivity. One, for example, will produce 200 tons of water-free oil per day, while another will give us only 2 tons of oil, this mixed in with 20 tons of water from the stratum. It is fully evident that the proportion of expenditures for the extraction of fuel at the second well will be many times higher. At various oil sites, this rate of expenditure will vary from kopecks to dozens of rubles per ton of oil extracted.

However, in all of this variegated picture it is not difficult to detect a definite conformitory characteristic of the present stage in the development of our petroleum industry. It consists of the fact that, today and in the near future, we will attain our basic increase in oil extraction by placing into operation sites which will require increased expenditures for their commercial exploitation.

In this situation, how can we achieve the highest effective use of these oil resources from a national economic point of view? Which underground deposits are we to exploit first and which should we hold off on? To what point in time do we continue to select oil from wells which are low in productivity and high in water content in our old regions in order to keep extraction expenditures within reasonable bounds? Using the usual economic criteria such as profits and economic viability it is impossible for us to provide the answers to these questions, which have a decisive significance in the selection of a strategy for the expansion of our oil industry.

Both of these indicators depend upon the scale of wholesale prices for oil, prices which are established for considering the average level of expenditure for all deposits in the oil region. This is absolutely correct. Yet when we speak of an individually selected installation, such an approach may give us a distorted concept.

A graphic example is the story of the placing of the Mishkinskiy Oil Field in the Udmurtskaya ASSR into exploitation. Its geological-field characteristics called forth a rather high level of expenditure which exceeded the established wholesale price for oil. In connection with the unprofitability of the field's exploitation, the State Commission of Experts delayed for quite some time confirmation of the plan for field construction work. In doing this, it did not take into consideration, however, the fact that the cost of extracting one ton of oil here, even though it was comparatively high, was nevertheless significantly lower than for a whole number of fields in other areas. It was only after prolonged and repeated discussion of this question on many levels that the decision was made to approve the draft plan for field construction and to place the Mishkinskiy Oil Field into exploitation.

Unfortunately, this example is not the only one. Oil industry expansion practice itself demonstrated the persistent need for creation of a new economic instrument which would be of assistance in resolving many questions connected with the assimilation of petroleum resources more rationally and effectively, from a national economic point of view. It was precisely such a situation which developed in a number of other mining industry fields also.

That is why, at the end of last year, the State Committee on Science and Technology and the USSR State Committee on Prices approved a "Temporary Typical Methodology for the Economic Evaluation of Useful Mineral Deposits." This document was the first to give official recognition of a new and more objective criteria for evaluating the effectiveness of the utilization of resources of petroleum and other useful minerals in accordance with so-called closed-end expenditures.

Without going into detail, it can be said that these closed-end expenditures are permissible at a given stage of the level of expenditures per

one ton of oil extracted where the volume of extraction for the nation has been established. The economic idea behind this indicator is that it represents the maximum level of expenditures. Exceeding that limit is inexpedient for any oil installation--be it the entire field or even an individual oil well.

If the individual expenditures exceed the level of the closed-end expenditures, then that installation is not worth placing into exploitation, inasmuch as the volume of oil which the nation needs to have extracted can be achieved without it. And, vice-versa, all installations with expenditures lower than those of the closed-in expenditures, should be worked inasmuch as the planned amount of oil will not be attained without any of them.

In other words, what opens up to us is a real possibility for facilitating fulfillment of the established plan for the extraction of oil with a minimum of expenditures and with the raw material base which we have on hand. Practical application of the closed-end expenditure indicator will allow us to evaluate, from a national economic position, the effectiveness of a whole series of extremely important and urgent decisions affecting expansion on the petroleum industry.

For example, selection of the correct strategy for opening up new petroleum areas in Western Siberia--our nation's main base for the extraction of oil and gas. Within the next few years, we will have to place into operation here a considerable number of comparatively small fields located in the northern regions of Tyumenskaya Oblast, an area which is difficult to reach. What it is necessary to do is to select the rational proper order for placing these fields into operation and the optimal pace for working them. Several variations are possible. An incorrectly selected decision would saddle us with additional expenditures of hundreds of millions of rubles.

That is why, at the present time, the workers of our industrial branch's economic services are engaged in an intensive working out of methodological questions connected with the practical application of the closed-in expenditure indicator. It was to this problem that a special meeting of the Section for Economics, Planning and Labor of the Petroleum Industry Ministry's Scientific-Technical Council was devoted. Basic principles for the creation of our industrial branch's methodology for the economic evaluation of petroleum deposits were worked out at that meeting.

Preparation of that methodology, however, is being delayed by a lack of agreement among the various basic methodological documents submitted by different governmental departments. Questions involving the economic evaluation of oil deposits are to be regulated by the "Temporary Typical Methodology" which we have already mentioned and which was approved by the State Committee on Science and Technology and by the USSR State

Committee on Prices, with the participation of the State Commission for stockpiling Useful Minerals under the USSR Council of Ministers. At the very same time, questions connected with the evaluation of the effectiveness of capital investment needed for placing these same oil fields into operation are being regulated by the methodology of Gosstroy USSR, a methodology based on completely different principles. As to the level of petroleum extraction at oil fields, all of this depends upon established planned volumes of extraction and the resources allocated for their attainment which were set by Gosplan USSR.

As a result of this, an extremely contradictory situation has developed in Western Siberia. At a number of new fields here at which work is to start, the effectiveness of capital investment as determined in accordance with the methodology of Gosstroy USSR turns out to be extremely negative. Approval of the corresponding draft projects and the beginning of work, therefore, cannot be approved. Gosplan USSR has already included in its plan for the extraction of oil the output from these fields.

Each of the agencies which we have named is putting together its own directive documents on the basis of sufficiently weighty concepts. However, when these directives "encounter" each other at one oil field, the contradiction and incompatibility of their requirements become evident.

In our opinion, all questions dealing with the assimilation of oil fields--evaluation of reserves, effectiveness of capital investment, expediency and order of priority for their being worked, optimal levels and dynamics of oil extraction, final efficiency of oil output--should be resolved on the basis of one and the same principles which facilitate derivation of maximum national economic effect. Inasmuch as these principles serve as the foundation for the "Temporary Typical Methodology for the Economic Evaluation of Useful Mineral Deposits," naturally it is on them that we ought to rework the corresponding documents of Gosstroy USSR and Gosplan USSR. This extremely important question must be resolved within the shortest time possible in order that the draft of the plan for expansion of the petroleum industry in the 11th Five-Year Plan, which is now in the process of being worked out, be built on identical principles for evaluating the effectiveness of utilizing mineral resources.

All of the components of our economic mechanism should function in coordination and interdependence in striving for a further improvement of final results. It is precisely this which is called for by the decree of the CPSU Central Committee and USSR Council of Ministers "On the Improvement of Planning and the Strengthening of the Influence of the Economic Mechanism on Improving the Effectiveness of Production and the Quality of Work.

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CSO: 1822

ENERGY CONSERVATION

LENINGRAD RESIDENTS ASKED TO DO THEIR PART IN WINTER APARTMENT PREPARATION

Leningrad LENINGRADSKA PRAVDA in Russian 12 Aug 80 p 2

[Article by A. Makeyev, Chairman of the Kalininskiy Rayispolkom Soviet of Workers' Deputies: "You Cannot Tell Winter To Wait"]

[Text] You would think that we would get used to it: every summer we get ready for the winter heating season, adjust the old heat and gas systems, build new ones, strengthen the capacities of boilers, repair our homes, and check the readiness of snow-removal machinery. One might say that all of this work is familiar to managers and that they have accumulated a great deal of experience in doing it.

But for some reason or other, winter always brings out things which we have failed to do. It never fails. No sooner do the first frosts strike and we begin to get complaints from the populace. Things we have failed to complete, things we have neglected. It is true, it might be added, that there were no really great gaps this past winter in the rayon, but we did make an analysis of our mistakes: we should profit from the lesson.

Kalininskiy Rayon is one of the largest in the city of Leningrad. It numbers more than one-half million inhabitants. The rayon's housing area is 11 percent of Leningrad's total housing area. Within the rayon, there are about 1,200 buildings and structures, 52 schools, 125 pre-school institutions for children, hospitals, polyclinics, palaces of culture, moviehouses, industrial enterprises, organizations and institutions.

Rayispolkom workers understand this fact: both the health and the state of mind of the populace and, in the long run, their capacity for work will depend upon how well the rayon gets ready for winter.

So, what do the mistakes of the past winter teach us? There were about 70 accidents on the "Teploenergo" lines during the past heating season. For 1 or 2 days, or often more, homes were without heat and at the mercy of the frost. To the rescue came accident repair brigades, these assisted by the repair workers of housing offices and trusts.

Accidents occurred on the lines mainly because, in testing them, "Teploenergo" did not use conditions which were severe enough. Now, those tests on the lines are more rigid and approximate, as closely as possible, the most difficult conditions of winter operation. These enable us to uncover weak spots and to eliminate the possibility of serious winter accidents.

In order to prepare homes for winter, a check must be made of the entire heating system, which should be thoroughly cleaned. For this purpose, compressors are required. One was allocated to us through central auspices but just one proved to be not enough. Workers of the rayon housing administration and of housing trusts here manifested their initiative: with the aid of construction workers and sponsoring enterprises they succeeded in putting another 11 compressors together and into operation.

Housing system workers today are particularly attentive as to cleaning out heating systems. The experience of winter past also helped teach us something. The repair of heating supply lines leading out from the Piskarevskiy Boiler House was completed just before the beginning of the heating season. We did not succeed in washing out the line and all the dirt ended up in our radiators. Gas pipes became blocked and, of course, we were inundated with complaints from people who lived in housing management areas 22 and 27. Now the washing out of all heating systems is an obligatory prerequisite in our preparations for winter.

I am intentionally giving you a great deal of detail about our preparation for winter because I think that nothing I say can be too trivial. It is very important for directors of enterprises and economic managers to become more deeply interested in affairs on the local level.

In order to wind up all prewinter work by 1 September, our rayispolkom controls the course of work in an operational and systematic fashion. During a July meeting of the rayispolkom, we heard the report of our housing administration chief engineer, A. A. Nessonov, who spoke of preparing our housing for winter. A number of comments on the progress of work were made and, very shortly, he will report once again at a rayispolkom meeting on the status of the heating system and on progress in getting that system ready for operation under winter conditions.

At our weekly operational meetings, chiefs of housing trusts within our rayon housing administration begin with information about winter preparation progress. Such systematic control keeps everything in hand. Today, it is gratifying to see that all of the trusts in the rayon are ahead of schedule in the conduct of their work.

Groups of deputies (we have 20 such groups) during their summer meetings discuss without fail the question of the course of preparation for winter of both our engineering equipment and our housing fund. Not a

single official document involved in placing apartment houses into operation is signed without the knowledge of the deputy group leader.

The readiness of housing for winter also involves the timely carrying out of repair work. Last year, there were many complaints about leaking roofs and wall panels and of radiators being out of order. Not always did housing agency workers react in a business-like fashion to such signals. For such an attitude towards complaints Engineer V. N. Voroshko of Trust No 3 under Housing Management Administration No 1 was relieved of his duties.

At the present time, every such signal is under the control of the rayispolkom and of its groups of deputies.

Practice demonstrates that, very often, success depends upon the conscientiousness of the people specifically designated to carry something out. For example, the brigade of fitters-plumbers led by A.A. Bogdanov under Housing Trust No 4 prepared all of their houses for the past heating system both on schedule and with a high-degree of quality; this allowed us to provide heat to all apartments within a minimum of time.

That is why the rayispolkom requires that housing trusts, after they have formed their brigades, carry out purposeful educational work among them so as to achieve such a conscientious attitude. At the same time, the rayispolkom requires that housing trusts not leave unpunished any incident of negligence of duty.

We would like here to reproach our construction workers. Whatever sins they commit in the construction of housing become particularly noticeable in the winter time. If they install, let us say, a defective wall panel, no radiator at all will be able to heat that apartment. Or, as was the case at Gruzhdanskiy Prospekt 104, there was insufficient heat because of poor roofing overlap. As a result of this, wall and floor tiles in 10 apartments were discovered to be frozen. This was confirmed in the documents of a commission in which representatives of the Leningrad Housing Design and Leningrad Scientific Research Design institutes participated. However, DSK-4 has still not eliminated the defect, which means that, again this winter, residents of those 10 apartments will again suffer serious discomfort.

Our rayon construction administration owes us a few things also. Last year, it disrupted the schedule for replacement of a heating supply line leading to school No 514 on Prospekt Nepokorennyykh. That work has been included in its plan for this year and I am certain that our construction people will get it done on schedule this time. The rayispolkom is keeping its eyes on their progress in this matter.

As of today, over 80 percent of the rayon's housing heating systems are ready for operation under winter conditions. The rayispolkom has taken

under its control the situation at those apartment buildings where things did not go particularly well last year. In the time remaining for them to be placed into operation, we shall once more return to them to see how things are going.

But it is important that the residents of those buildings themselves learn how to conserve heat. The conservation of fuel is a state-wide problem. No one should simply be an onlooker. It is within the ability of residents to prepare their apartment windows and doors for the onset of winter cold.

You cannot tell winter to wait. People should meet it in their warm apartments, with hot water in their baths and in their kitchens. To that end, the Rayapolkom has taken additional measures for improving the work of dispatcher and emergency services, for improving the material-technical base of its housing fund, and has concentrated attention upon the strengthening of discipline and personal responsibility of service leaders in matters entrusted to them. All this enables me to state with certainty that workers of our rayon housing administration will keep their word after having taken upon themselves the obligation to complete preparations for winter by 25 August.

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CSO: 1822

MEASURES TO IMPROVE GAS INDUSTRY PLANNING ACTIVITY

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 80 pp 3-5

[Article by V.M. Kuzenko, chief economist of the Ukrugazprom (Ukrainian Gas Industry) Production Association: "With Accounting of Conditions and Experience"]

[Text] In the system of means to improve management of the economy an important place is allocated to strengthening cost accounting (Khozraschet) as one of the methods of planned management of social production. It is precisely on the basis of further development of cost accounting (khozraschet) in production associations and at enterprises together with other measures that the main task, the achievement of greatest efficiency of production and the improvement of work quality, will be solved.

V. M. Kuzenko, chief economist of the "Ukrugazprom" Production Association, acquaints the readers with proposals and measures to improve the planning activity of the production association.

In the "Ukrugazprom" association purposeful, creative work is being done on the highest-quality and timely preparation of a very important document of the party and government.

Much attention is being given to work on the completing of certificates by production associations and enterprises in accordance with the forms developed by the Ministry of the Gas Industry which take into consideration specifics of the sector.

Verifying calculations have been made and the possibility of application in planning the normative "net production" index (in extraction, processing and machine building) has been examined. Since with worsening of the mining and geological conditions (the working of reserves, pressure drop and reduction of well flows, reduction of the volumes of gas and condensate produced, increase of costs, etc) the component part of the "net production" normative profit tends to be considerably smaller, giving a larger error than in estimations on the basis of effective wholesale prices, use of that indicator in an extractive subsector is inadvisable.

Application of the "net production" indicator assumes exclusion of the influence on volumes of production above all of materials and spare parts manufactured at other enterprises. In gas extraction no expenditures are made on the "construction" of production (of gas, condensate or petroleum) and therefore there are no distortions of the volumes of production. In connection with that the effective procedure in estimating production in the gas extractive subsector should be reduced, reflecting more correctly the estimate of the activity of enterprises.

Gas refining and machine building production have a very small share in the total volume of Ukrgeazprom production--about 5 percent. With worsening of the mining and geological conditions, profits in gas refining will diminish (with increase in condensate cost), and this also will lead to distortion of both the indicator of volume of net production and the indicator of labor productivity.

As regards the machine building sector, in Ukrgeazprom there is the "Ukrgaz-energoremont" enterprise, which in essence accomplishes the capital repair of gas-pumping units at pumping stations. Expenditures for materials and spare parts are not included in the prices for repair services (production) and consequently there are no distortions of the indicator of the volumes of work in that subsector.

On the basis of the above we consider it necessary to preserve the existing procedure for determining volumes of production and calculating the indicator of labor productivity.

At the present time the Ukrainian Scientific Research Institute of Gas is charged, together with the enterprises, with preparing all the methodical positions regarding the conducting of intradepartmental khozraschet in the extraction, refining and transportation of gas, in drilling, and also at repair and trucking enterprises and in construction.

Ukrgazprom takes an active part in the examination of methodical developments of the All-Union Scientific Research Institute of the Gas Industry and their introduction at enterprises.

In the final year of the Tenth Five-Year Plan technical organizational and economic engineering measures have been worked with respect to the practical implementation of tasks flowing from the resolution of the party and government on improvement of the economic mechanism. In them special attention is given to the development and introduction of technical solutions, new in principle, which permit substantially elevating the technical level and improving the efficiency of production.

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CSO: 1822

UDC 621.643/553.002+62.001.7

WORK OF MINNEPTEGAZSTROY DISCUSSED, ROLE OF YOUNG SPECIALISTS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 7, Jul 80 pp 1-6

[Article: "Tasks of Young Scientists and Specialists of the Branch to Accelerate Scientific and Technical Progress"]

[Text] During the 4 years of the 10th Five-Year Plan the organizations and enterprises of the Ministry of Construction of Petroleum and Gas Industry Enterprises have done a lot for the further increase in output of the oil and gas extracting fields and pipeline transportation. Units have been constructed for complex oil preparation for 150 million T and gas for 138 billion m³ per year. Forty thousand kilometers of pipelines have been laid, including 8,000 km of gas pipelines 1420 mm in diameter. Two hundred and fifty-three compressor and pumping stations have been put into operation, cable and radio-relay communications lines stretching 15,456 km, and housing of total area 5.310 million m². The volume of work done exceeded the level attained in the same period of the Ninth Five-Year Plan.

The good results of the activity by the collectives of the Ministry of Construction of Petroleum and Gas Industry Enterprises are due to a considerable measure to acceleration in scientific and technical progress in line and surface construction. The young scientists and specialists of the branch make a weighty contribution to solving the most important organizational, technical and technological problems. In recent years an economic effect of over 3.5 million rubles has been obtained from the introduction of the creative works of the young engineers and technicians; over 50 people have been awarded diplomas at the all-union competition inspection of the scientific and technical creativity of young people.

The contribution of the young people is especially perceptible in the development of such an effective direction of scientific and technical progress as perfection of the set-block method of construction. The following young specialists display a high degree of activity in this matter: S. A. Akopyan, A. F. Malyavin, D. M. Zalmanov, N. V. Osadchaya (special planning and design office "Proyektneftegazspetsmontazh"); N. M. Pastukhova, B. M. Shnayterman, V. M. Ryabov, S. N. Matveyev (VNIIST [All-Union Scientific Research Institute for Construction of Main Pipelines]); V. M. Suslin, A. A. Otboyev, L. S. Bobrova, V. K. Vlasov (Experimental Design Office for

Reinforced Concrete); V. Ya. Kharitonchik, T. A. Razumovskaya (Siberian Scientific Research and Planning Institute of Gas Construction); M. M. Meshcheryakov, V. S. Koksharov, V. V. Safonov, V. L. Andreyev, A. V. Bokhovnov, V. M. Martynenko (Sibkomplektmontazh); N. A. Gnoyanova (Tvumen' Main Administration for Construction of Oil and Gas Industry Enterprises) and many others.

In the 11th Five-Year Plan the Ministry of Construction of Petroleum and Gas Industry Enterprises faces implementation of a broad program of capital construction. The total volume of work for the branch will significantly rise as compared to the 10th Five-Year Plan.

The regions of West Siberia will receive further primary development; the percentage of oil and gas construction here will increase a great deal.

The branch is being technically re-equipped in order to solve the set tasks. Among the most important problems is improving the scientific and technical preparation of production, development and introduction of new construction technology, further perfection of the available equipment, and creation and output of basically new machines and mechanisms.

Currently the Ministry of Construction of Petroleum and Gas Industry Enterprises has five scientific institutions, two planning-design organizations and nine production-technical firms and trusts of Orgtekhnstroy. The activity of the institutes and design offices has been concentrated on key directions for the development of the branch. The successful activity of the institutes and design offices is primarily determined by the working out of major problems and the introduction of their results in short periods, which guarantees further scientific and technical progress in construction of oil and gas industry enterprises.

The system of planning scientific and technical progress is constantly being improved; it is based on the program-target method, compilation of long-term forecasts, five-year and annual plans. Over 30 organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises in the current five-year plan are participating as executors in the realization of 22 interbranch programs approved by the State Committee of the USSR Council of Ministers on Science and Technology, USSR Gosstroy and the USSR Academy of Sciences. Work on the main trends in branch development in the 10th Five-Year Plan is being carried out on 10 scientific production programs that cover practically all the areas of activity of the Ministry of Construction of Petroleum and Gas Industry Enterprises, and are also associated with their complex solution in the organizations of the Ministry of the Gas Industry, Ministry of the Petroleum Industry, USSR Ministry of Ferrous Metallurgy, Ministry of the Chemical Industry, Ministry of Tractor and Agricultural Machine Building and other ministries and departments.

These programs include long-term trends for scientific and technical progress; perfection of control over the construction of petroleum and gas industry enterprises; increase in the quality and reliability of the main

pipelines; increase in the rates of construction of the linear section; reduction in the periods for construction of facilities of civil and industrial purpose; improvement in the methods for laying pipelines on swampy and flooded territories; development of pipeline container transportation; low mechanization of construction.

Analogous comprehensive scientific production programs are currently being compiled for the 11th Five-Year Plan.

The young scientists and specialists of the branch are participating in the realization of such programs.

Increase in the throughput and reliability of pipeline systems. Technical and economic calculations show that the most effective direction for the growth in productivity of pipeline transportation is optimization of the working parameters of the transportable product (increase in gas pressure, reduction in its temperature, increase in the temperature of the pumped oil, etc.).

It is required that new brands of pipe steels be made, new pipe designs, improved insulation materials, equipment, welding materials, more advanced methods of welding, insulation, quality control, means of electrochemical protection, designs of underwater switches, etc.

In the field of gas pipeline construction progress will be attained by means of increasing pressure to 10-12 mPa with preservation of the pipe diameters to 1420 mm. For this it is necessary to organize production of pipes with high strength characteristics, as well as with high resistability to avalanche destruction. The Ministry of Construction of Petroleum and Gas Industry Enterprises jointly with the USSR Ministry of Ferrous Metallurgy as a result of lengthy searches have created a number of new brands of pipe steels that do not contain scarce alloying components.

The Ye. O. Paton Institute of Electric Arc Welding has suggested welding pipes from individual multilayer shells 1.5 m long made of roll steel.

A check of the multilayer pipes has shown that their cold resistance is considerably higher than in the monolithic samples of the same thickness made of the same steels. This means that the pipes for operation under northern conditions can be made of low-alloy steels.

However, the multilayer pipes have reduced transverse rigidity, which causes certain difficulties in constructing pipelines. Whereas the transport of pipes, their storage and welding of turning joints can be carried out according to the standard technology, the cleansing, insulation and laying require additional solutions.

Other pipe designs are also being worked out, including two-layer, spiral-seam, surface-reinforced (bandaged), compensation with spiral corrugation, etc. All of them, evidently, require serious changes in the technology of pipeline construction. The young scientists and specialists of the branch, as well as the young production engineers should be involved in the solution of such problems.

The transition to construction of pipelines rated for pressure of 10-12 MPa with the use of traditional methods of welding will make it necessary to increase the number of welders by 15-18%. Therefore the technical thinking must be directed towards reducing the labor-intensity of the welding operations on the route to guarantee their high quality.

It is promising to mechanize welding of two- and three-pipe sections by means of perfecting the design of the field pipe-welding bases and introducing mechanized methods for welding nonturning joints.

Considerable progress is planned in the use of contact welding of pipes from 114 to 1420 mm in diameter. This method will permit a 5-10-fold increase in labor productivity as compared to the arc methods of welding. However with the use of contact welding on large-diameter pipelines certain difficulties arise, in particular with power supply.

The methods of soldering large-diameter pipelines to a certain measure are a continuation of the idea of contact welding.

Soldering makes it possible to reduce the energy outlays in connecting pipes, to decrease the deformation of hot edges, and to obtain a joint with the minimum changes in the zone of thermal effect. Experiments have demonstrated that soldering of the joint regardless of its diameter takes no more than 3 min. Thanks to the simplicity and high productivity of soldering it guarantees high efficiency especially on the northern routes.

In recent years a new direction has developed in welding, welding by laser beam. It is promising for construction of large-diameter pipelines. The labor intensity of the operation is reduced 3-fold, and the consumption of electricity approximately 5-fold. The creation of industrial units for laser welding of pipelines is linked to the solution of many complicated scientific and engineering problems.

The reliability and durability of the pipeline operation to a considerable degree are due to the quality of their anticorrosion protection. With a rise in the diameters and temperatures the mechanical and thermal loads on the insulation coatings sharply increase.

Good quality polymer insulation coatings with high labor productivity are obtained under plant conditions. Fabrication of plant insulation of large-diameter pipes (over 1000 mm) has been provided for at the enterprises of the USSR Ministry of Ferrous Metallurgy.

Pipes with plant insulation will be manufactured at the Volga, Khartsysk, Chelyabinsk and Vyksa plants. The quantity of pipes with plant insulation coming to the construction sites rises each year. By the end of the 11th Five-Year Plan it is planned to switch to construction of main pipelines primarily made of pipes with plant insulation.

In this respect the mastery of modern technology for constructing large-diameter pipelines made of pipes with plant insulation is one of the most important tasks of the branch.

The young scientists, engineers, technicians and workers must take an active part in solving this problem.

Traditional bitumen insulation materials and polymer tapes will still be widely used in the near future. Therefore the scientists will work systematically to perfect these materials.

The use of such new insulation materials as organosilicon tapes, bitumen-polymer primers and compositions, and polymer tapes requires that the young specialists master the technology of their application and its further improvement.

In the area of constructing underwater switches of the main pipelines, basically new design and technological solutions are currently being advanced. The young specialists are also assigned large tasks in this matter.

The method of construction based on the principle of drilling inclined-directed tunnels and pushing the pipeline after the drilling unit will permit an increase in the rates of constructing underwater pipelines 2-3-fold, and complete resolution of the problems associated with protection of rivers, reservoirs and large water basins. It is planned to master the method of loosening underwater rocks by explosives with guaranteed protection of the environment and the ichthyofauna.

The branch has expanded work to make pipe-laying and pipe-burying barges designed to construct pipelines at depths up to 30-40 m, which affords a broad outlook for construction of underwater oil and gas lines up to 1420 mm in diameter under complicated natural and climate conditions. A whole complex of work remains to be done in this direction, including scientific research, manufacture of new equipment and its mastery under production conditions.

The introduction of the pipe-laying barge for the construction of four branches of the underwater gas pipeline through the Kuybyshev reservoir allowed the work to be completed in 4.5 months instead of 2.5 years set by the plan. The pipe-burying barges are designed for excavation after the pipeline has been laid on the bottom of the reservoir. Here the dimensions of the trench to be made are reduced 5-10-fold, which creates great potentialities for increasing the rate of building the underwater junctions.

Perfection of work organization and comprehensive mechanization. Mechanized complexes that construct pipeline sections are used in line construction.

Analysis of the actual data shows that there are significant reserves for increasing the output of the mechanized complexes by 100% and more. Measures are being taken to perfect the scientific preparation of the work of the complexes.

A lot of attention is focused on improving the technical and economic preparation of construction by means of current planning of the work of the complexes that is thoroughly balanced in resources. This will permit an efficient implementation of the weekly and daily operational planning for the controllable indices of the individual processes.

A reduction in the delays for organizational reasons will be promoted by an increase in the degree of centralization of the auxiliary work. A change in the organizational forms will create complex administrations for the main work and specialized administrations for auxiliary work within the complex trust.

Labor productivity can be increased by a rise in the level of mechanization and automation of the welding and loading-unloading operations, ballasting of the pipelines, and cleaning timber from the construction zone. Systematic work must be done to increase the unit output of the technical equipment, and the level of unification and reliability. A growth in productivity will also be guaranteed by a change in the working and living conditions of the workers in the complexes: broader use of equipment in the northern design, lamps with automatic power sources, covers for warming, special clothing; improvement in the cultural and general services, organization of food services, living conditions, transporting of the workers to the work site and back.

The creation of an equipment reserve can increase the output of the complexes and individual columns by 10-12%. The expediency of employing several types of reserve has been established: operational, insurance and repair.

Work to create and master equipment for pipeline construction is following two courses: by the forces of the design organizations and the plants of the Ministry of Construction of Petroleum and Gas Industry Enterprises, and with the involvement of the machine construction organizations of the other ministries and departments. Now series production is being developed for 56 highly efficient excavating, load-lifting, transport and special machines and mechanisms.

In order to fill the shortage of machines and mechanisms and spare parts for them further increase is planned in the output of the branch for machine construction products by means of technical re-equipping and reconstruction of the active plants.

The fleet of construction and transport equipment available in the branch should be supplemented by machines of high power and output that are suitable for work in northern conditions and on swampy ground. They include bulldozers with looseners based on T-330 and T-500 tractors, efficient excavators, pipe-layers, pipe lengthy carriers and cranes with large lifting capacity and cross-country capability, four-wheel drive combines for cleaning and insulating pipes, machines for bending pipes 1420 mm in diameter. The universal machines with control panel for welding 1020-1420 mm diameter pipes, equipment of the "Styk" type for welding nonturning joints, and machines for electric contact welding are progressive types of welding equipment.

The need for prolonging the construction and transport seasons into the fall and spring periods requires the continuation of work to perfect the swamp vehicles. Special construction equipment should be fabricated on the basis of these machines.

It is necessary to increase the unit output of the excavators and perfect the methods of working hard and super-hard soils. The differential method of working trenches, rotary cutting of slits for exploding the ground with delayed charges, etc. have been acknowledged to be efficient.

It has been stipulated that the forces of the Ministry of Construction of Petroleum and Gas Industry Enterprises create and introduce a highly productive rotary trench excavator ETR305 based on the K-701 tractor with output of the power unit 330-367 kW for working frozen ground.

An important task is the use in construction of rotary trench-filers which will permit an increase in the quality of filling with frozen ground and reduce the width of the right of way. The TR351 trench-filler has been made that is comparable in output to the bulldozers of the same power and on the frozen breastwork fills up to 1-1.5 km of trench per shift.

It is planned to build excavating equipment for work on flooded and swampy sections, including single-bucket excavators on rubber-metal caterpillar tracks with bucket capacity up to 1 m³ and floating four-wheel drive excavator-cranes with bucket capacity of 0.65 m³.

Work will be continued on improving the operating output of the horizontal drilling units to build 1020-1420 mm pipeline junctions under railroads and automobile roads.

The special combined machines significantly improve the quality of insulation; they simultaneously clean the surface of the pipes and apply polymer film materials and protective casings.

A further growth in operating efficiency of the earth equipment is planned by means of making a set of equipment that includes interchangeable working equipment for loosening heavy soils and rocks; equipment for quality control of the work to be done, delivery tugs, refueling pontoons, etc.

The organization of repair of technical equipment in the branch should be perfected in several directions.

It is expedient, in the first place, to increase the degree of centralization of the repair services. For this purpose within the construction-installation trusts administrations should be set up for centralized repair and maintenance. A centralized system of spare part distribution is needed that includes a network of pyramidal structure warehouses.

There should be a significant change in the quantitative and qualitative composition of the repair base. It should have collapsible covers with

heating, semi-stationary rooms of the repair workshops, two-way radio communication equipment, mobile repair and maintenance equipment, mechanized tools, diagnostic equipment, test stands, etc.

Development of the set-block method of construction. The set-block method is firmly entrenched in the working practice of the branch. In 1980, using the set-block method the branch will master 69% of the work to erect industrial surface facilities; in West Siberia this volume will be 66%. The enterprises of the Ministry of Construction of Petroleum and Gas Industry Enterprises are now producing residential, social-cultural-general, and industrial facilities; the sections of the buildings have a total useful area of 0.5 million m^2 per year.

In the initial period, before 1978 the development of the set-block method was characterized by the use of monoblocks of relatively low weight arranged on the general plan of the object with gaps between them. The next stage was honeycomb arrangement of the block-boxes above the pipeline floor. The pumping stations of the oil pipeline Surgut-Polotsk, the compressor stations of the gas pipeline Urengoy-Chelybinsk-Petrovsk-Novopskov and a number of other objects were planned on the basis of this principle. On the average there was a double reduction in the labor intensity of construction at the site when a switch was made from the traditional solutions to monoblock, and an additional 1.5-fold reduction in the labor outlays with the use of the honeycomb arrangement.

The idea of block designs has currently been distinctly formulated. This idea is realized in the making of enlarged blocks of cluster pumping stations and multipurpose designs of absorbers in West Siberia.

The developments on auxiliary structures of compressor and pumping stations using open arrangement of the block-set designs are efficient; this sharply reduces the number of boxes, panels, aluminum designs and profiled planking.

One should note the positive work of the young planners in the institutes and design offices of the branch. Thus, for example, the young specialists of the special design office "Proyektneftegazspetsmontazh," VNIIST [All-Union Scientific Research Institute for the Construction of Trunk Pipelines], and the institute of Giprotruboprovod have made a draft block oil repumping station with open arrangement of the main units with output of 12,500 m^3/h .

Over a number of years at the main gas pipelines block-set compressor stations with gas-repumping units GPA-Ts-6.3 with drive from aviation machines developed by the VNIPiGazdobychey [All-Union Scientific Research and Planning Institute of Gas Extraction] and the VNIIST have been introduced.

An analogous unit GPA-Ts-16 is being made. A unit is being developed with drive from a ship engine. This unit has a high degree of plant readiness, but in contrast to the GPA-Ts-6.3 and the GPA-Ts-16 it is placed in a building. The problems of making a unit in the block-container design can

be solved by the joint efforts of the young specialists of the Ministry of Construction of Petroleum and Gas Industry Enterprises and the Ministry of the Gas Industry. The problem of providing small-sized coverings must be solved for the greater part of the gas repumping units that are manufactured and prepared for production.

The traditional plans of the compressor stations are cumbersome, and labor intensive which does not permit their rapid construction with low labor outlays. Therefore the perfection of the equipment and plans for the compressor stations are now the most urgent problem.

There are the greatest reserves for reducing labor intensity and the periods of compressor station construction in improving the designs of the gas repumping units. A considerable effect can be obtained with the transfer to construction of compressor stations with units of 25 MW output, and with the introduction of a full-pressure supercharger with output of 20 MW of the type 235. This equipment is being developed extremely slowly by the Ministry of Power Machine Building.

The technical difficulties in developing the new highly productive technological equipment can be overcome by the joint efforts of scientific and engineering thinking with the broad participation of the young specialists and scientists of the related fields.

Thus, one result of the cooperation between the VNIIST, Central Design Office of Petroleum Equipment of the Ministry of Chemical and Petroleum Machine Building, and the Institutes of the Ministry of the Gas Industry was new designs of technological equipment for the gas fields: multipurpose unit designs (for example, unit of absorption drying of gas with output of 5 million m^3 /day that combines the functions of preliminary cleaning, drying and trapping of DEG [expansion unknown] in a single housing). With the use of these units the SibNIPigazstroy [Siberian Scientific Research and Planning Institute of Gas Construction] has made a draft UKPG (unit of complex gas preparation) for the Urengoy field.

An analogous unit has been developed (on the absorption drying of gas plan) with increased output of 10 million m^3 /day. The experimental model was prepared for testing under field conditions. The introduction of such units will permit a 25-30% reduction in the volumes of construction and installation work and a 7-2.5-fold decrease in the metal consumption of the equipment.

The VNIIST jointly with the Central Design Office of Petroleum Equipment (TsKBN) and the VNIPigazdobytey are working to make unit designs of TsKPG to be placed in the block-container or open arrangement for the northern regions. Such designs will exclude the major buildings where the technological equipment is currently installed, and will guarantee a high degree of plant readiness of the facility based on the joining of construction designs to the equipment.

The SPKB (special planning and design office) "Proyektneftogazpetromontazh" with the participation of other organizations of the Ministry of Construction of Petroleum and Gas Industry Enterprises and related ministries, the Ministry of the Gas Industry and the Ministry of the Petroleum Industry, have made unified bulk-planning designs for general plans of compressor stations, in particular, with two-row arrangement of the main gas repumping units (GPA-Ts-6.3 m) and in a module design.

The institute SibNIPigazstroy and the association Sibkomplektmontazh jointly with the Giprotyumenneftegaz (Tyumen' State Institute for Planning Enterprises of the Petroleum and Gas Industry) are developing an important trend in construction industrialization, namely, the creation of superblocks for facilities of the petroleum and gas industry. Superblocks have been made for pumping stations that weigh 160 and 215 T.

Analogous planning designs are being made in the SibNIPigazstroy for the gas fields and compressor stations.

The Kiev branch of the VNIIST and the VNIPigazpererabotka (All-Union Scientific Research and Planning Institute of Gas Refining) of the Ministry of the Petroleum Industry are working out block-modules of gas refineries (GR) on floating bases. The output of such GR can be gradually increased as the field is developed, and when it is exhausted the block-modules are dismantled and transported to other fields.

Research has currently been done and recommendations have been prepared for the creation of large-sized large-tonnage block-modules weighing up to 1200 T and 80x20x20 m in size.

This trend in the industrialization of surface construction in the next five-year plan will become one of the primary and will promote a significant reduction in the periods for erection of facilities in the northern conditions.

Unification of designs. Reduction in metal consumption. Unification of the load-bearing metal designs has been developed for the production and auxiliary buildings of the oil and gas industry facilities; it has been adopted and approved by the Ministry of Construction of Petroleum and Gas Industry Enterprises, the Ministry of the Petroleum Industry, and the Ministry of the Gas Industry.

Based on this unification the technical documents have been made for the load-bearing metal designs with the use of new economical profiles of rolled products for the entire nomenclature of unified plans. The frames have been unified both for sizes and for designs. Their application, in combination with the light-weight industrial panels developed by the experimental design office for reinforced concrete for walls and roofs will guarantee complete delivery of the load-bearing and enclosing design components to the construction site. The introduction of unified frames will reduce the consumption of metal by 10-30% and the labor intensity of installation by 14-20%, as well as increase the operating qualities and reliability of the designs.

In order to reduce the labor outlays with the erection of production buildings using unified frames on surface facilities of the oil and gas pipelines unified pilework has been designed. This allowed only three types of foundation slabs to be used under all the compressor shops. Unified precast reinforced concrete foundations were also made under the large-capacity tanks.

In order to reduce metal consumption new and promising two-layer roof panels of the PPD type and wall panels of the SPD type are being introduced. The use of such panels will reduce the consumption of steel to 47% per 1 m² of enclosure, and will improve the quality of the enclosure designs and the outer appearance of the buildings. The output of SPD and PPD panels has been started at the enterprises of the Sibkomplektmontazh association.

Easily assembled buildings are designed for use as production areas at the facilities of the oil and gas industry. Tests of building fragments revealed their suitability for different industries. The buildings can be assembled on different types of foundations depending on the local conditions, which is an advantage over the other similar designs.

For the country's regions of difficult access, including for the northern regions of West Siberia building plans are being formulated made of light block-containers of residential and cultural-general purpose, and draft mobile blocks of varying purpose.

The duty residential complex that was made in the branch is being series fabricated at one of the plants of the Ministry of Construction of Petroleum and Gas Industry Enterprises. The duty residential complexes were assembled in 1979 in the construction of the Kuybyshev-Lisichansk, Uktha-Yroslavl', Surgut-Polotsk and other pipelines.

An architectural-planning solution and working drawings have been developed for a duty residential complex for 56 people, working drawings for a two-story apartment type building, cafeteria for 60 seats, sanitary-general building, and architectural-planning designs for a club for 150 seats. All of these buildings are assembled from container type boxes made on the basis of a single base unified design. Drawings have been completed for a sports complex assembled from SKZ [Syzran' Combine Plant] sections and block-containers; the complex includes a pool and athletic hall.

For operation under route conditions different versions of residential units based on the TsUB [expansion unknown] and the therapeutic-prophylactic unit "Tonus" are being manufactured in series.

The work for typification, unification of buildings and structures, and increase in the industrialization of their fabrication will yield a saving in 1980 of about 4.5 million R, and the economic effect will further rise even more.

Introduction of the expedition-watch method. The application of the expedition-watch method was governed both by traditions of pipeline construction that was always done at high rates with a concentration of the forces of the mobile construction-installation subdivisions, and by problems of accelerated development of the oil and gas regions and the development of pipeline transportation in the country.

Expedition-watch construction combines the practice of watch and expedition methods of working.

The watch method is efficient with relatively short distances for transporting the personnel and stable communications between the watch settlements and the base cities. It is used in the Ministry of Construction of Petroleum and Gas Industry Enterprises mainly in the development of fields.

The expedition method of construction that was formed in the Ministry of Construction of Petroleum and Gas Industry Enterprises provides for inter-regional use of labor resources, as well as movement of the subdivisions considerable distances within a large region. The workers live at the facility in field cities, while the labor cycle is often limited only to the periods of constructing the facility.

Expedition construction, in meeting the specific nature of the branch, rapidly concentrates specialized forces and qualified personnel at the most important national economic facilities and reduces the preparatory period and total periods of construction. The active system of pipeline transportation was erected by precisely such a method, and the line and surface construction in the oil and gas complex of West Siberia also uses it.

The expedition-watch system includes the method of developing new territories, forms of production organization and the method of interregional use of labor resources and social infrastructure.

The economic effect in the expedition-watch method comes from the reduction in periods of construction, the transfer of outlays for the development of a social infrastructure to the inhabited regions, reduction in the personnel turnover and improvement in their professional training.

However the use of the expedition-watch method still does not correspond completely to the active legal and technical norms, often has an irregular nature, and does not sufficiently satisfy the social demands of the workers. A number of organizational, managerial and method problems need to be solved; a system of privileges, stimuli and compensations needs to be introduced and efficiently employed, and variants of the work and rest patterns have to be worked out.

For the purposes of broader introduction of the expedition-watch method of construction it is necessary to: significantly improve the branch planning of contract activity; determine the most important facilities and zones of primary activity of the expedition organizations in line, surface and

housing construction in the next five-year plan; to regulate the structure and staffs of these organizations, bearing in mind that besides the production program they support the vital activity of the workers, interchangeability of personnel, rebasing of equipment and long-distance transfer of people. Structural questions should be worked out, and methods examined of organizing the construction industry, transportation plans, conditions of life support, and patterns of work and rest. Perfection of the estimated price formation is also required. The estimates should reflect the outlays of the contract organizations for regular transfers of workers, payment of days off, business trips, bonuses for the mobile nature of work, etc. The increase in the estimated cost under conditions of expedition conditions can reach 1.5-4% in line and surface construction and up to 17% in housing construction. However these expenditures are compensated for by means of the significant national economic effect obtained as a result of the use of the expedition-watch method. The system of wages and privileges should be improved for the expedition workers: there should be a more complete reflection of the specific nature of the method, increase in stimulation and the regulating role of material reward.

It is necessary to affirm the state architectural-planning standards for construction and operation of the field cities after providing for an improvement in the living conditions of the expedition workers, increase in quality, mobility of housing, introduction of new volume planning decisions of watch and field cities with regard for the adopted work and rest cycles. The transfers of the expedition-watch personnel should be regulated and the primary trends of the transport traffic defined; it is necessary to develop a material base for the transportation branches. One should concentrate the housing construction for the operational workers in the large population points and intensify cooperative construction.

The branch "Statute on Expedition-Branch Construction" should be put into operation; it reflects the problems of planning and controlling production, the patterns of work and rest for different types of work and regions, the order of computing working time, the organization of personnel transfers, etc.

The program of scientific research work for 1981-1985 on the problem "expedition" (watch) method of construction and interregional use of labor resources" needs to be expanded.

Promising types of transportation. The VNIIPtransprogress (All-Union Scientific Research and Planning Institute of Transportation Progress) with the participation of other organizations in the branch have conducted a set of studies to reveal the technical and economic expediency of creating such types of transportation as pipeline container, including pneumocontainer and systems with conveyor trains, pipeline hydraulic (pulp pipe) of solid materials and transport systems on magnetic suspension using electrical line propelling devices.

The introduction of the indicated transportation systems into the national economy will exclude the unprofitable railroad hauling, and release a

considerable number of heavy-freight trucks; will solve the problem of main hauling of large volumes of fuel and raw material resources from the extraction sites to the consumers.

The first steps are being made to solving these problems, and certain practical results have already been obtained. The first experimental-industrial systems of pipeline pneumatic-container transport have already been built; they extend up to 7 km.

The operation of these systems under conditions close to the natural defined a number of characteristics of reliability, durability, suitability for repair that cannot be analyzed on small-scale models and units. Based on the findings corrections are made in the technical documents, the technical and economic indicators are pinpointed, and consequently, the spheres of application of transport system of such type. The main units of the pneumatic container systems of agricultural purpose using nonmetal pipelines are undergoing test verification.

It is planned to make a pipeline container system with output of 100 T/h and length of 300 m.

However, as the study results showed, the pipeline container systems are not applicable to transporting large volumes of national economic freight (coal, ore concentrates) distances about 1000 km. At the same time the railroad lines on individual sections are operating with great intensity in hauling fuel and raw material resources, and in the future the situation will become even more complicated.

As a result, in addition to the further development of railroad transportation a decision was adopted to create and develop in the country main pipelines for transporting coal and ore concentrates in the form of pulp. Such pipelines have considerable throughput, require a small number of service personnel, and have the possibility of complete automation. They are constructed in shorter periods than the railroads. The Ministry of Construction of Petroleum and Gas Industry Enterprises jointly with the Ministry of the Coal Industry and the USSR Ministry of Power and Electrification have been entrusted with the planning and construction of the country's first experimental and industrial pipeline extending 250 km for pumping coal in the form of pulp from Kuzbass to Novosibirsk.

Planning of another major pipeline system for hydraulic transportation of iron ore concentrates from Krivoy Rog to Donbass has been started jointly with the organizations of the USSR Ministry of Ferrous Metallurgy. It is 460 km long.

The creation of the pioneer pulp lines will permit the working out in the 11th Five-Year Plan of the technology to plan and build pipelines for pumping solid materials and to prepare the scientific production base for the broad introduction of this efficient type of transportation into the national economy.

The scientific and technical foundations have been worked out for the creation of systems with line electrical drive and controllable magnetic suspension. The mastery of similar basically new transportation systems is a complicated and expensive task whose resolution is planned in several stages.

It is planned in the 11th Five-Year Plan to construct the first experimental passenger system extending 10 km on an electromagnetic suspension.

The scale of the problems that have to be solved in formulating new and continuous types of transportation requires the involvement of specialized organizations of many branches.

The list of scientific and technical problems shows what potentialities are opened up for the creative activity of the young scientists and specialists.

The resolution of the set tasks will promote an acceleration in scientific and technical progress in the branch.

The leaders of the construction organizations, and scientific institutions must organize the creative labor of the young scientists and specialists so that it is directed towards the obtaining of the most advanced and efficient solutions.

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FUELS

PROBLEMS IN FUEL TRANSPORT CITED

Figures for August

Moscow GUDOK in Russian 3 Sep 80 p 1

(Unattributed article: "Fast Delivery for Urgent Freight")

[Text] August has not brought anything new in fuel shipments as our transport as before has not met the quota. By the end of the month, the backlog rose to 3.5 million tons of coal. The reasons for the lag are the same: the slow traveling of the loaded and empty gondolas and tankcars, the poor preparation for loading, and the unreliable delivery of empty rolling stock. For example, on 25 August alone, the railroad workers did not deliver 1,183 cars to the mines, including: the Donets Railroad was short 308 cars, the Tselinnaya (Virgin Lands) Railroad 279 cars, the Kemerovo Railroad 226, and the Eastern Siberian Railroad 268. On 26 August, the railroad workers were close to fulfilling the technical plan. As for the network just 49,200 tons were not loaded. This day the Northern Caucasus, Southeastern, L'vov, Sverdlovsk, Eastern Siberian and Transbaykal railroads operated well. But, of course, the overall result was most influenced by the basic coal-shipping roads, the Donets, Kemerovo, Northern, Tselinnaya and Alma-Ata which on this day did not fulfill the quota.

How did the railroad workers do on the last day of August? They failed to provide the miners with 1,933 gondolas. Only five railroads fulfilled the quota for coal shipments: the Northern Caucasus, Northern, Odessa, Tselinnaya and Eastern Siberian. The Donets Railroad shorted the mines by 867 gondolas. But also due to the fault of adjacent railroads, all in all 1,366 gondolas were not used. The miners were also let down by the railroad workers of the Pridneprovskaya, Moscow, Alma-Ata and Far Eastern railroads.

As a total during the month, the quota was fulfilled by just five railroads: Sverdlovsk, Eastern Siberian, Transbaykal, Southeastern and Northern Caucasus.

We are often inclined to criticize the coal-shipping railroads for the nonfulfillment of the quota, but the figures also show that the regulating

mainlines are also to blame for this. For example, in August as an average per day they shorted the Donets Railroad by 599 cars, 499 cars for the Kemerovo Railroad and 144 cars for the Tselinnaya Railroad. And in the last days of August the Baltic, Gor'kiy, L'vov and Northern Caucasus railroads began to turn over more than the planned number of make-up gondolas.

The Northern Caucasus Railroad has improved the situation with the transporting of oil products. From 25 through 27 August alone, this line dispatched 284 loaded tank cars above the quota. The last day of the month was a record, with 440 tankcars loaded above the technical plan! Things are also going well on the Southern, Pridneprovskaya, Donets and Azerbaijan railroads. At the same time, there is an alarming situation with the loading of oil products on the railroads of the Volga Region, the Urals, Siberia and the Far East. As a total for the railroad network, on 27 August, for example, the railroad workers had not delivered 1,554 tankcars for loading. And on the last day of the month, the overall shortfall was 1,035 tankcars.

Problems at Mezhdurechensk

Moscow GUDOK in Russian 3 Sep 80 p 1

[Article by I. Kochura, chief of the Mezhdurechensk Station: "How to Make Up the Arrears?"]

[Text] This year the Mezhdurechensk stationworkers owe the state more than 900,000 tons of coal. Each month the debt increases. And the misfortune is that we are unable to make up the debt. For 6 months running, we have received less than our quota of gondolas. And we lack them now. In July alone, as a result of energetic measures undertaken by the leadership of the Ministry of Railroads, the supply of empty rolling stock has increased, and for this reason we have met our operating plan for loading fuel and even dispatched 14,000 additional tons.

However, the quota of the ministry has not been fulfilled. And at the same time the coal workers have refused the gondolas four times. Is it not strange that rolling stock is in short supply and at the same time it is not required?! The problem is that we are given a quota to carry out the fuel which is mined plus stocks at the storage piles. At present, the enterprises served by the Tomusinskiy Industrial Transport Administration have 408,000 tons of coal in storage. But a check disclosed that 225,000 tons at present can virtually not be loaded.

However, the miners shamefully keep quiet about this and even conceal the true state of affairs. In order that the coal workers recognize the unrealistic nature of the plan and issue refusal orders, we should promptly supply empty rolling stock for loading, even if there is nothing to load. But we cannot follow such experiments, while we know that the rolling stock is essential for other stations where coal actually exists today.

The accelerated shipping of fuel is greatly complicated by the poor movement of the trains to the east. For example, in August the Abakan Division of the Krasnoyarsk Railroad did not accept 195 trains from us.

On 14 August, at the four receiving and dispatching points for the eastern fleet there were nine trains destined for Tayshet, Nakhodka, Khasan, as well as two empty Korshunova circuit-working trains. We were compelled to send four units to park "B." As a result, the handling of the coal trains from the PTU [?Loading and Transport Administration] was delayed, the distributing of local freight was made more complicated, and empty cars stood idle waiting for the make-up tracks. This sort of thing happens daily at our station. It is time, finally, for the main traffic administration to impose order at the Mezhdurechensk junction.

Regardless of the difficulties, the collective is doing everything to dispatch fuel as quickly as possible for the winter stores. In employing advanced labor methods, in improving production methods, and in relying on cooperation with related railroads, we are working for the efficient use of the rolling stock. For example, in the first half of August the stoppage of a local freightcar was reduced by 6 hours, by 5 hours in one loading operation, and by 2 for a transit car with reprocessing. The best results in the pre-congress competition have been achieved by the shift of the switching dispatcher A. Ustyuzhanin and the station dutyperson, the honored transport worker of the RSFSR, O. Khlebnikova.

But the collective needs immediate help to make up for its coal loading debt.

Ekibastuz Coal

Moscow GUDOK in Russian 6 Sep 80 p 1

[Article by the GUDOK brigade F. Batkin, L. Turov and A. Shirokov, Ekibastuz--Pavlodar: "Unit Trains on a Long Run"]

[Excerpt] The coal trains leave Ekibastuz in various directions, and the empty rolling stock comes back both smaller in number and poorer in quality. Often gondolas arrive here which are unfit for loading, they must be uncoupled and there are no facilities for mass repairs. Then the operations of the station and the spurs are disrupted, the cars "settle" here, depriving the junction of maneuverability.

We might stipulate that at present the situation has changed but this was the case. The railroad workers did not succeed in promptly delivering the empty units to the mines, and then the machinery halted and coal mining ceased. In order to prevent this, everyone at the junction operated under a great stress.

In a word, the fuel shipments came at a great price. The Tselinnaya Railroad and the main traffic administration of the ministry sought out ways

For improving the complex process of long-distance coal delivery. As usual, the experience of production innovators helped. Practice showed that the transporting of power raw materials, for example, from the L'vov-Volynskiy Basin or from the mines of the Donets Basin to nearby power plants using "unit trains" provided good results. So what about using this method in moving the large masses of Ekibastuz fuel?

Before starting the experiment, involved calculations were made which would determine the optimum traffic variations for the circuit-working trains weighing up to 5,000 and more tons. Consolidated routing schedules were created for them. In order to eliminate the empty run, provision was made for maximum loading on the return leg. Thus, cars emptied of coal in Zolotaya Sopka travel to Magnitogorsk loaded with ore and are then returned to Ekibastuz.

While the technical and organizational preparations were underway, the unit trains were put into service one after another. The train dispatchers mastered the tight schedule, and the locomotive crews made trial runs with the heavy trains at high speeds.

It was soon apparent to everyone that the new method of shipping coal was fully effective. In actuality, while previously the abundance of malfunctioning cars in the empty units seriously disrupted the operations of the Ekibastuz junction, now, when the unit trains are made up of well-repaired solid-bottom gondolas with roller bearings, the problem of their additional preparation has disappeared. In coming back from the power plants, without any particular delay they are sent to the mines for loading. An average of 3.7 hours is spent on inspecting and overhauling the malfunction discovered in a so-called network empty car, but the processing of the unit train takes just 0.9 hour. Thus, 6,000-car hours are saved per day. Ekibastuz Station can breathe more easily, as the flow of "heavy" empty cars in no way overwhelms it.

Time is also gained in unloading coal at the power plants. The car tilter rotates and then puts any "crating" back on the tracks, but if the car is equipped with sliding bearings, another quarter of an hour is needed to repack the lubricating boxes. But a car with roller bearings can be dispatched immediately after unloading.

Thus, the experiment justified the hopes of the railroad workers. Now 156 circuit-working trains are hauling Ekibastuz coal, and this is 80 percent of the entire rolling stock delivered here.

One of the fans and supporters of the current shipping method, the chief of the coal and ore department of the Traffic Service of the Tselinnaya Railroad, Yuriy Moiseyevich Volobuyev, who follows the movement of each unit train not only on his own railroad but also on the neighboring ones, has summed up certain results of the new operations: loadings over the last 8 months, in comparison with the same period of the previous year, rose by 143 cars per day. Also characteristic is the important detail that

the power plants which are supplied with fuel by the circuit-working trains are better stocked with fuel for the winter season than those which receive it, as before, by the network units.

The new operations require stricter traffic discipline on all the railroads handling the unit trains, the work cannot be approached using the old measures and habits, and it tolerates neither local interests nor a parasitic attitude which in some places still surfaces. Is it tolerable when the Southern Urals and Sverdlovsk railroads hold up the empty cars destined for Ekibastuz coal, thereby disrupting the rhythm of the "large ring"? And it is even worse at the Alma-Ata Railroad. Since the start of this year, around 90 circuit-working trains have been taken over for the needs of this railroad and diverted from the hauling of fuel for the power plants. And generally speaking these mainlines still have not realized the obligation of a preferential treatment for the unit trains and they hold up the fuel conveyor.

We have watched while powerful rotary machines have stood idle at the Bogatyr' mine merely because there were no empty cars. The cars at this time were somewhere far away from Ekibastuz. On individual days the coal miners fail to receive two or three unit trains. And the adjacent railroads are to blame for this.

Incidentally, the Tselinnaya Railroad has still not done everything to make certain that the progressive methods operate continuously and provide a greater effect. In developing the competition for exemplary fuel shipments, its commanders are more concerned with dispatching the coal, and they are doing everything within their power to increase the pace, but here are acting at times solely from self-serving positions. According to the rational system, the loaded trains should be dispatched via Petropavlovsk and Presnogor'kovskaya for the Sverdlovsk and Southern Urals railroads. But on these routes, the operations of diesel locomotives have been poorly organized, there are many engines out of operation and hauling is difficult. Instead of organizing things there, the local commanders divert the coal flow to Tobol'sk which is the most congested junction on the Southern Urals Railroad. The question is further aggravated by the fact that at this junction there is a weight train. Groups of cars are uncoupled from the units trains and these cars then for days chase after the basic section of the train, and are often simply lost en route.

The leaders of the Tselinnaya Railroad are well aware that the Tobol'sk junction (like, incidentally, the Chelyabinsk one) cannot rapidly process unplanned traffic, but nevertheless they continue to send this there. Are they not aware that this slight local advantage of more rapidly turning over the consists to the neighbors ultimately ends up bad for the Tselinnaya Railroad itself? It is very late in receiving back the empty cars, and the rhythm of coal loading is disrupted.

Life has shown that in order to speed up the delivery of the Ekibastuz coal to the power plants and eliminate the losses in hauling, it is essential to

develop comprehensive competition of the adjacent railroads. For this purpose the representatives of many power plants, railroads and coal strip mines recently met in Ekipastuz with the Pavlodarskaya obkom of the Kazakh Communist Party. They outlined the ways for introducing the new shipping methods and the political support for this important task, they approved taut socialist obligations, and signed an agreement for labor cooperation.

The comprehensive competition for the railroad workers, coal miners and power workers to fulfill the joint precongress obligations is a dependable path to general success.

Problems at Kemerovo

Moscow GUDOK in Russian 6 Sep 80 p 1

[Article by GUDOK correspondent V. Denisenko from Kemerovo: "Kemerovo Paradoxes"]

[Text] During the 8 months of the current year the railroad workers of the Kemerovo Railroad have dispatched 1.53 million tons of coal less than in the same period of last year. The railroad possessed the locomotives, the capacity and the personnel, but did not meet the quota for fuel shipments.

The collective of the mainline is accelerating the car turnaround. The stoppages in one loading operation are declining. It is operating with a much smaller fleet than last year. And here each day 200 or so fewer cars are loaded than a year ago. Is this not strange?

The problem is that in the first half of the year as a daily average the fleet of empty cars along with the reserve of the MPS [Ministry of Railroads] was 698 units less. The delivery of rolling stock to the coal workers was also 378 gondolas under. The car shortage became one of the reasons for the nonfulfillment of the loading plan.

In July, after the radical measures approved by the MPS, the railroad each day had 1,835 units more empty cars than in the same month of the previous year. As a result, the state loading plan was overfulfilled, but the increased quota was not met. Over the 8 months, the lag behind the technical plan reached 12 million tons of coal.

The main problem is that the empty cars are turned over spasmodically, and around 40 percent are received by the railroad during the final hours of the report days. The situation is aggravated by the fact that the railroad workers of the Kemerovo Railroad and the commanders of the main traffic administration are more concerned with fuel loading and not with shipping it out of the Kuznetsk Basin. The Kemerovo Railroad has been turned into a holding tank for abandoned eastern trains. For this reason the coal trains stand idle for days on the spurs, stations and sidings.

In order to receive steadily the daily 4,580 gondolas for making up the fleet, trains must be received without obstacle from the Western Siberian Railroad. But the Kemerovo Railroad is unable to provide normal acceptance. The excessive transit car fleet to the east prevents this.

From the end of March to the middle of May, the Krasnoyarsk Railroad received the trains comparatively steadily. But then things turned bad. The Nezhdurechensk junction was particularly busy, and as a result each day 30-40 east-bound abandoned trains piled up on the Kemerovo Railroad. These basically were at the Belovo and Novokuznetsk divisions. And it is here that almost all the Kuznetsk coal is loaded. These trains tied up the stations of the Southern Kuznetsk Basin.

Each day the Tayga dispatchers sent out at least five locomotives as a reserve to Mariinsk. But on the leg of Bolotnaya--Mariinsk there was more than a score above the required. And at this time at the Kemerovo subdivision of the Tayga division there was nothing to pull the coal trains. Each day 10-15 engines were lacking. And the units at the stations of Biryulinskaya, Zaboyshchik and Latyshi stood idle for an average of up to 3 days awaiting departure.

Thus, in order to load coal in the Kuznetsk Basin, it is essential first of all to haul it. This is impeded by the poorly organized passage of the eastern trains over the interroad junctions. The main traffic administration must analyze the operation of the junctions on the railroads of Siberia and the Far East, particularly on the route Nezhdurechensk--Abakan--Tayshet. Emergency measures are required to normalize the train situation. This is the main condition for providing the Kuznetsk Basin with empty cars and for prompt coal loading.

The efficient use of scarce rolling stock is also sharply reduced by the slow loading at the underground and strip mines, and this has not only not been accelerating, but at a number of them has declined with a rise in coal output. Thus, at the Zyryanovskaya mine of the Yuzhukuzbassugol' [Southern Kuznetsk Basin Coal] Association there were three loading points with a total productivity of 770 tons an hour. At present only one remains loading 500 tons an hour.

At the Chernigovskiy mine they built an enrichment unit which improved coal quality. However there were no storage facilities here, and as a result the car stoppages have risen from 1.3 hour up to 13 hours.

Today, coal workers can load a c. - in 10-30 minutes. Therefore, with intensive delivery of empty cars, they cannot handle them quickly and will refuse delivery.

The railroad workers of the Kemerovo Railroad at present are introducing a whole series of measures aimed at accelerating the movement of the cars, their processing and loading in order to make up for the failings, and to replenish the winter stocks at the power plants and industrial enterprises. For this they need the help of the MPS and the collectives of the adjacent railroads.

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CSO: 1829

UDC 622.013.3:658.5.018.2

TECHNICAL PROGRESS IN COAL INDUSTRY

Kiev UGOOL' UKRAINY in Russian No 8, Aug 80 pp 1-4

[Article by V. A. Boronin, first deputy minister of the Coal Industry Ukrainian SSR: "Technical Progress--Basis for Expansion of the Coal Industry of the Ukrainian SSR"]

[Text] In all collectives concrete measures for the coming 26th Congress of the CPSU are being developed and realized. Subjects of particular concern for ministries, institutions and party, soviet, professional-union, and Komsomol organizations must be assuring the further development in the coal, oil, gas, metallurgical and machine building industries and energy, increasing the assortment and quality of consumer goods, and the improvement of work, transportation and capital construction.

From the CPSU Central Committee resolution: "On socialist competition before the 26th Congress of the CPSU."

Coal industry workers will mark "Miner's Day" in an atmosphere of great labor and political upsurge evoked by decisions of the June (1980) Plenum of the CPSU Central Committee. Decisions adopted at that plenary session on the convening of the next, regular 26th Party Congress evoked in miners of the Ukraine a fervent desire to gladden the motherland with news of new labor achievements. The Communist Party and the Soviet Government devote constant attention to the coal industry of the Ukraine and to its further expansion on the basis of mine shaft technical reequipment, the improvement of working conditions, and increasing the material level and cultural-living conditions in the lives of miners.

Scientific-technical progress has become the decisive factor in the expansion of the republic's coal industry. During the 10th Five-Year Plan, much attention was paid to expansion of the mine shaft network and improvement of its structure through construction of new mines and

reconstruction and modernization of existing mines, together with a high level of mechanization and concentration of production. Over the 4 years of the 10th Five-Year Plan, an 11.08 million ton coal mining capacity was achieved, 9.1 million tons of it through the introduction of new mines and 1.98 million tons of it through mine reconstruction. The ranks of existing mine shafts were joined by the shafts named in honor of Stakhanov, shaft no 10 at the "Velikomostovskaya" Mine, the shafts named in honor of the Heroes of the Cosmos, and the "Zapadno-Donbasskaya" Mine's shafts 16/17 (now named in honor of the Leninist Komsomol of the Ukraine), plus the reconstruction of such large mine shafts as the "Krasnolimanskaya," "Krasnyy Partisan," "Novo-Butovskaya" and others. Technical reequippment of the mine working faces of the Ukraine continued. Volume of coal extracted from complex mechanized drifts increased from 79 to 100 million tons. Along with this, there was an increase in the number of mine working faces and in the extraction of coal as a result of the introduction of new equipment and technology at coal seams with a thickness of less than 1.2 meters. Use of coal-mining complexes opened up the possibility of a greater concentration in the extraction of coal (the daily mine-head workload has been increased by 1,000 - 2,000 tons or more) and of a higher productivity per worker at the mine head (10 tons and more per day).

Wide-scale use was made of mechanized combines under favorable geological-mining conditions at mine seams with a thickness of more than 1.2 meters and with stable mine roofs. At the present time, there are 674 KM-87 type mechanized combines employed in republic mines.

In order to accelerate scientific-technical progress, it is necessary to create a means of complex mechanization for the extraction of coal from thin and short mine layers. The efforts of collectives at our industrial branch's scientific research and design-construction organizations are being directed towards solution of this problem. On the slopes of thin mine layers (with thicknesses of up to 1.2 meters), only 179 drifts have been equipped with KMK-97 and "Donbass" mechanized complexes. Complexes in various combine variations are being used on coal layers with thicknesses of 0.9 meters and more and on plane layers of 0.8 meters and more. Among their shortcomings are a high degree of sensitivity and rigidity when it comes to the roofs of mines. The extraction of coal on the slopes of thin mine layers (less than 0.7 meters thick) has been mechanized at the present time through use of planers and scraper-planers individually secured to wide-cut combines. Over 34 percent of the coal extracted from short mine layers is gotten out by mechanized means, with over 17 percent of that total mined by coal-mining complexes. This is explained by the fact that the extremely complex mine engineering conditions involved in the working of short layers set back the creation of equipment for the extraction of coal. ANSHCH [expansion unknown] mine-heading units and KGU [expansion unknown]

mechanized complexes are now in series production and are being made available to mine shafts with steeply-inclined strata; these facilitate coal extraction in strata with a thickness of 0.8 meters or more and can be used on strata with lateral rock of no less than average rigidity. A series of complex programs aimed at the creation of mechanized means for the mining of thin coal strata were developed in 1979. One of these programs calls for the creation of an equipment unit for the extraction of coal on sloping strata ranging from 0.55-0.8 meters in thickness; the unit consists of a mining combine (scraper), a conveyor, and individual supports (hydraulic pillars with dual expansion). Within the immediate future, plans call for the series production of equipment to be used in the mining of strata 0.7-1.2 meters thick. These include the 1KM-103 mechanized complex with a KSSH-4 hydraulic pillar attached; KD-80 mechanized equipment complex for mining conditions involving unstable lateral rock; a universal complex in 2 variations (combine or planer) for 0.7-1 meter thick strata with a 35 degree angle of dip; a modernized SO-75 planer unit with 2 actuating units. Plans for the distant future call for the improvement of the KGU-D and KG complexes and the ANSHCH mine-heading unit for mining strata with steep dip angles.

Special emphasis should be attached to work aimed at resolving a very complex technical and social task--the extraction of coal from very thin strata without the use of any people at all; side-by-side with the working out of the theoretical basis for this method of coal extraction under industrial mining conditions various technological solutions were verified.

Getting the BUG-3 drilling-auger unit into series production was a significant achievement. Our experience in using them in the Donets and Karaganda coal basins demonstrated that they are effective in the working of strata occurring under complex mining-geological conditions. BSHU mobile drilling-auger units have been created and their acceptance tests have begun.

Work on the creation of means for the automatic remote control of coal mining equipment is being intensively conducted. It was through the efforts of scientists and designers that we were able to resolve a series of basic tasks. Thus, a system for automatically controlling KM-87A complexes has been insured by subsystem control of supports, conveyor, combine and lubrication units. All of this allows us to extract coal and to strengthen mine faces without people having to be in constant attendance. The control panel is available at the entry. There have been significant changes in equipment and technology for conducting, strengthening and protecting mine workings and well drillings. Over the years of the 10th Five-Year Plan, the volume of drilling using combines increased 1.5 times. The level of mining through combines has reached 24.2 percent while our inventory of coal-mining combines is up to 691 units. Even more powerful and productive coal-mining combines such as the GPK, 4PP-2 and the KN cutting complex have replaced the PK-3m, the PK-3r and the PK-9r.

An analysis of labor expenditure in carrying out coal-mining operations with the aid of combines and blast-hole drilling along with the mechanized loading of coal which has been mined shows us that, in the first instance, the expenditure of hand labor is 1.8 times less. Expansion of the combine mining method, therefore, is the chief factor in raising labor productivity in coal mining operations. For the Ministry of the Coal Industry of the Ukrainian SSR, the average speed of combine movement is 155 meters per month as against an overall speed of 58.3 meters under all methods.

Over the next 5-6 years, we intend to raise the volume of preparatory coal mining operations with the aid of combines to 32-34 percent, thanks mainly to the introduction of the 4PP-2 and KN combines. Today we still do not have coal-mining combines for strata with a strength of over 6. Scientific research and design-construction organizations should create combines for work under such conditions in order to facilitate an average tempo of movement of not less than 155 meters per month.

Wide use is being made in the mines of 3-link metallic arch supports, which facilitate the effective support of mine workings where the roof is composed of 400-500 mm of mixed rock. For workings on gently sloping strata with large misaligned roofs (as in the Donets Coal Basin), supports with a design pliability of up to 1,000 mm have been created for use in vertical shafts, with corresponding reserves used to stop rock sagging. Use of these supports enables us to achieve maintenance-free support of mining operations on all strata with lateral rock which is either stable or of average stability. Nevertheless, all of the existing process for the strengthening of mining operations requires even further improvement inasmuch as it requires a multitude of operations and is difficult to fit in with complex mechanization.

We have had placed before us the task of seeking out fundamentally new decisions which would allow us to make maximum use of the supporting capability of the rock strata itself, to relieve it of surface pressure and, at the same time, to lighten and to simplify supports and to eliminate the more labor-consuming operations in installing those supports. One of the steps which we took in that direction was the use of anchor supports capable of holding a great deal of weight, this in the struggle against the displacement of unstable stratified layers of rock. Work is now being done on improvement of anchor support design and on a means of mechanization for their installation. In the realm of protecting mining operations, the technology of working recessed mine sections proved to be pointless on the basis of results derived.

As for underground mine transport, technical reequipment there was achieved through introduction of conveyors for carrying out the coal mined on horizontal and inclined mine workings plus introduction of haulage through the use of locomotives of large coupling weight capacity

plus use of heavy-freight coal cars and the mechanization of auxiliary transport. All of this led to an increase in the number of mine heads with continuous transport (to 76.2 percent), to an increase in the level of conveyor transport on horizontal mine workings (to 20.5 percent) and on inclined workings (to 52.3 percent), and to an increase in the productivity of electric locomotives to 17,200 ton-km per month.

Plans are under way for improvement of the technological transport arrangements at 74 mines with considerable reserves of coal, this is to be accomplished by placing mining operations in better order, by increasing and concentrating underground freight flow, and by making maximum use of the technical capabilities of transport equipment now in series production.

As our mines get deeper, coal extraction conditions become more complex and worse. Many of our technical decisions based on overall requirements as to the operation of mines at shallow and average depth are inapplicable when it comes to deep mines. The negative influence of such natural factors as the presence of more gas, mine pressure, strata temperature, danger from strata as to unexpected ejection of coal and gas, the likelihood of mixed strata to cast out rocks--all these can be decreased through scientifically based planning of coal mining operations. Our industrial branch scientific research and design organizations have proposed a number of solutions. Among them are a system of columns, with coal being removed through reducibility and washing out, columnless systems for the preparation and working of pillars of coal, schemes for drilling into recessed sections together with separate dilution of methane gas at the source of their detection, the working of strata from which rock is likely to drop but with full protection, etc.

However, absence of resolute and fundamental investigation of strata from which rock is likely to drop is noticeably impeding the effectiveness of the work of our industrial branch technological institutes and is limiting possibilities for the creation of an improved technology for the working of dangerous strata.

Achieving the workloads designated and planned for mine heads which have been cleared, this as to the gas factor, is not possible without the wide use of degasification, which has become an inseparable part of the technological process for the mining of gas-bearing strata. Under conditions which exist in the Donbass, basic technological systems have been developed and a determination made as to the parameters of methods for the degasification of strata being worked with the aid of water combined with blasting at mines being worked. Experimental use of this method has been made and preparations are being pushed for its introduction on an industry-wide scale.

The heat situation in deep mines is becoming worse, with the temperature of strata surrounding mine workings increasing on the average of more than 0.5 degrees (c.) per year. Stationary and mobile refrigeration equipment is being introduced into deep mines for the normalization of these heat conditions. Various mine engineering measures are being widely applied, these decreasing the heating of air on the routes towards the mine head (by increasing the quantity of air, cutting off the path of its movement, and by drying out mine workings). Also being used is a method whereby the cooling action of the surrounding ore atmosphere is increased, this through wetting down and airing out the working area.

Large reserves as to increasing the amount of coal mined and as to improving the technical-economic indicators of mining enterprise operations are contained in the experience of socialist competition leaders, experience which is being disseminated. At mines of the Ukrainian SSR Coal Industry Ministry there has been further expansion of socialist competitions between brigades, the goal being 1,000 tons of coal or more extracted per day from one mechanically-cleared mine head. At the present time, 104 brigades within the republic are working with such a capacity.

Remarkable success has been achieved by brigades of workers clearing mine heads, these headed by A. Ya. Kolesnikov, V. G. Murzenko, N. N. Skrypnik, A. D. Polishchuk, N. S. Shkolyarenko, G. I. Motsak, V. M. Bortsenko and others.

The Ukrainian Communist Party Central Committee has approved the initiative of 10 leading brigades which have set into motion a movement for increasing the workloads at coal seams of strata which do not have large capacities. This movement is being widely supported at republic mines. Following the example of these innovators, 184 brigades operating under such conditions are mining 500 tons of coal or more per day. Great success in the extraction of coal from thin strata has been achieved by leading collectives of workers headed by brigade leaders P. Ye. Venger, S. F. Anfinogenov, N. N. Sidorenko, I. V. V'yunik and others.

These high workloads at cleared mine heads have been attained by leading collectives as the result of well thought out technical, technological and organization preparation of these mine heads for operation. These brigades see to the precise organization of work, the timely co-ordination of basic processes and operation in the mine, plus the timely and qualitative carrying out of work involving the technical servicing and repair of equipment and the constant seeking out of reserves.

Improvement of the organization of production and labor, the dissemination of the experience of leading brigades which have achieved high work indicators at cleared-out and preparatory mine heads will be expanded further.

By the end of 1980, our plans call for increasing the number of brigades mining 1,000 tons or more of coal per day to 140, with the number of brigades mining over 500 tons per day to be increased to 200. Some 265 brigades will be working at a tempo which is 1.5-2 times above that of the norm and they will be doing that this year.

At the June (1980) Plenum of the CPSU Central Committee, General Secretary L. I. Brezhnev stated: "Preparation for the new party congress is a mighty lever for raising the political and labor activity of both party members and of people who are not members of the party." The collectives of coal mines, sections, brigades moving forward to meet the 26th Party Congress and the 26th Party Congress of the Ukrainian Communist Party have taken upon themselves new and higher obligations aimed at the uninterrupted provision of fuel for the nation and are fully resolved to carry them out.

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CSO: 1822

DEVELOPMENT OF NEW YAMBURGSKOYE GAS FIELD IS BEGUN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Sep 80 p 3

[Article: "A Gas Complex"]

[Text] The Central Dispatching Administration of the USSR Ministry of the Gas Industry. Within its walls there is a silvery contour map of the nation. There are hundreds of signal lights within the spiderweb of white lines. These are symbols of gas fields, compressor stations and main gas trunklines of the Consolidated Gas Supply System of the Soviet Union. The operator presses several keys. The code is selected and the adroit electronic beam fills the screen of the television monitor with luminous green lines: "Yesterday, 17 September 1980, 1,058 million cubic meters of natural gas were extracted in the USSR." In 1975, an average of 793 million cubic meters were extracted per day from our gas fields. Yes, it was only during the present 5-year plan that our gas miners selected a very high goal of 1 billion cubic meters of "blue fuel" per day. Incidentally, they provided the nation with less than 6 billion cubic meters during all of the year 1950.

Our modern gas industry is an important component of our fuel-power complex. Its proportionate share is increasing constantly: 5 years ago, gas constituted less than 22 percent of all fuel extracted, while today it is over 25 percent. But gas is not simply fuel. It is also a universal technological raw material for the chemical industry which today yields synthetic rubber and mineral fertilizers, cleansing agents and inorganic fodder, plus dozens of other types of products. The "Soyuz" Gas Trunkline, which was put together through the combined effort of the USSR and European nation-members of CEMA, opened up new possibilities for deepening and expanding socialist economic integration.

Our nation occupies first place in the world as to confirmed reserves of natural gas. In order to deal with these resources in a business-like manner and with maximum effect, large amounts of capital investment funds are being poured into the expansion of our industrial branch. During the 10th Five-Year Plan alone, over 14 billion rubles were allocated to it. Today, such main gas centers as Orenburzh'ye, Urengoy, Medvezh'ye, Vuktyl, and Vungapur are rapidly expanding their capacities.

When the mineral resources of Western Siberia were first being "talked up," the "blue fuel" share of it in the nation was figured not in the billions but in the trillions: since the beginning of the 5-year plan, a little less than 1.7 trillion cubic meters of gas have been extracted. The rate of expansion of the West Siberian area is without parallel in world economics. Whereas in 1965 the amount of gas extracted in Tyumen' came to .003 billion cubic meters, this year it exceeded 150 billion. It was only on 22 April 1978 that the commercial exploitation of the first wells in Urengoy began; today, long-range plans are being made for the extraction of 200-250 billion cubic meters of natural gas per annum from that field. Just within the past few days, the first exploration party of the Main Administration for Construction of Petroleum and Gas Industry Enterprises in Tyumen Oblast began preparations for placing a new deposit on the shore of the Ob' Gulf--the Yamburgskoye Gas Field--into operation. At capacity, it will be second to Urengoy and will begin providing the nation, this during the next 5-year plan period, with 100 billion cubic meters of gas per year.

During the 10th Five-Year Plan, the Consolidated Gas Supply System of the Soviet Union received further expansion. All of our industry's services operate today in fixed, precise rhythm--from extraction and transportation to distribution, storage and processing. The Srtov-Moscow gas pipeline, which was placed into operation in 1946 as the nation's first such line, was only 800 km long; today, the network of "blue fuel" arteries has exceeded 135,000 km. Our high degree of automation--60 percent in the field and over 90 percent at compressor stations--facilitates more rapid tempos in the increase of labor productivity in our industry. Over the present 5-year plan, it has increased by 43-45 percent.

Constant introduction of technological innovations also contributes to this. Well diameter is being expanded, drilling speed is being increased, and wide use is being made of a combined, or as it is also called, battery method of drilling. Fields are being provided with equipment set up in blocks, equipment with a large consolidated capacity. The productivity of one of these technological devices is now 5 million cubic meters of gas per day.

Our gas extractors today have solidly mastered the technique of duo "blue layers" at depths of up to 4,000 meters. Ahead of them lie the Paleozoic Era deposits of natural resources, the oil and gas virgin land of the West Siberian platform. In short, we do have a reliable raw material base. That signifies that we also have new possibilities for a more effective expansion of our national economy. Just the shift over to gas in industry will ensure us an increase in labor productivity of not less than 1 percent. Also, prospects for its utilization as a technological raw material for our chemical industry are practically unlimited.

These days, the workers of our industrial branch have taken up a "shock" shift posture in honor of the party congress which is to come. The goal of this closing year of the 5-year plan is 435 billion cubic meters of gas per year--they have given their word to reach that goal ahead of schedule.

UDC 622.279.1/4.001.24

CONDENSATE EXTRACTION OF DEPOSITS OF WESTERN TURKMENIYA

Moscow GAZOVAYA PROMYSHLENOST' in Russian No 5, May 80 pp 16-18

[Article by B. Khydyrkuliayev, Turkmen Scientific Research and Planning Institute of Petroleum]

[Text] Investigations conducted in the Turkmen Scientific Research and Planning Institute of Petroleum have shown that the degree of influence of a porous medium on the value of the condensate extraction coefficient depends not only on the heterogeneity of the reservoir, the conditions of inflow of the gas condensate toward the well bottom hole, the mineralogical composition of the rocks, but also on the specific surface of the porous medium.]

Gas and gas condensate-oil deposits discovered in recent years on the territory of Western Turkmeniya require a unique approach to compilation of a plan for their rational development and exploitation.

Table 1 presents the results of many years of investigation of production of the deposits and their characteristics. It is evident from Table 1 that the yield of stable condensate amounts to about $200-210 \text{ cm}^3/\text{m}^3$ on the average for the deposits of Western Turkmeniya, and for some deposits, Kotur-Tepe for example, of the middle red level-- $300 \text{ cm}^3/\text{m}^3$ and of the lower red level-- $290 \text{ cm}^3/\text{m}^3$. Investigations of most prospecting boreholes of the Barsa-Tel'mes deposit (lower red level) have confirmed a yield of condensate of $420 \text{ cm}^3/\text{m}^3$ and more.

In Western Turkmeniya in investigations of the gas-condensate character of the condensation isotherm the condensate losses are established by means of PVT-7, PVT-8 and UGK-3 apparatus. However, investigations with such equipment do not permit taking into account the influence of the porous medium on the thermodynamic behavior of gas-condensate mixtures.

It is known that during the planning of the development of gas-condensate deposits to exhaustion the condensate extraction coefficient of the stratum is determined experimentally or by calculation. To estimate the degree of

Table 1. Main parameters of gas-condensate formations of deposits of Western Turkmeniya

Deposits	Horizon	Initial formation pressure, kg (force)/cm ²	Formation temperature, °C	Mean well shear temperature, °C	Stable cogenicate yield, cm ³ /m ³	Extractive coeffectiveness at p = 1 kg (force)/cm ²	Gas density (relative to air)	Gas viscosity, cP	Condensate molecular measure	Stratum conductivity, D. m/e . p	Stratum permeability, MD	Allowable initial gas discharge per well, 1000 m ³ /day
Okarem	G	248	58	45	120	0.68	0.735	0.610	0.0204	120	18.0	150
	D	255	63	47	130	0.65	0.729	0.625	0.0204	120	24.0	120
	I	295	70	48	160	0.57	0.735	0.640	0.0216	120	30.0	300
Kotur-Tepé	II	300	72	48	160	0.54	0.730	0.630	0.0216	120	13.0	300
	III	302	72	-	169	0.50	0.729	0.617	0.0217	120	11.0	400
	MR	450	85	-	300	0.43	0.760	0.626	0.0219	140	5.3	705
	LR	480	88	-	290	0.46	0.761	0.626	0.0220	145	4.2	900
Kizyl-Kum	II + III + IV	315	73	57	240	0.59	0.762	0.640	0.0216	141	18.1	200
Kamyshlidscha	LR ₁ + LR ₂	450	80	62	280	0.38	0.769	0.660	0.0277	147	13.0	650
Barusa-Gel'mes	LR ₄	210	59	47	112	0.63	0.735	0.617	0.0186	126	26.5	42.0
Kuydzhik	LR ₅	480	95	75	220	0.40	0.767	0.660	0.0277	160	11.3	700
Gogran-Dag	LR ₃	630	110	-	420	-	0.797	0.630	-	163	7.3	45.0
	LR ₁	350	81	-	145	0.60	0.763	0.620	-	145	5.1	15.0
	LR ₂	417	87	-	140	0.47	0.771	0.650	-	150	22.0	328

Table 2. Condensate extraction coefficients according to investigations of formations of deposits of Western Turkmeniya

Deposit	Well	Filter, m	Initial data	% without con- sideration of porous medium,	
				m, portion of unity	K, D cm ² /cm ³
Kizul-Kum	224	3501-3513	0.18	0.0420	637
Kuydzhik	12	2811-2818	0.13	0.0630	950
Gogran'-Dag	9	3084-3166	0.17	0.0273	2360
Gogran'-Dag	9	3305-3314	0.15	0.0262	1870
Kotur-Tepe	697	3075-3085	0.18	0.0450	610
K _c with constant porous medium, %				43.5	43.5
K _c without con- sideration of porous medium, %				60.9	60.9
K _c with constant medium, %				25.6	25.6
K _c without con- sideration of porous medium, %				32.8	32.8
K _c with constant medium, %				40.5	40.5

Influence of the porous medium on phase transformations, special investigations were conducted by us in the Turkmen Scientific Research and Planning Institute of Petroleum. The results of those investigations have shown that the degree of influence of the porous medium often is commensurable with the experimental error. In a number of cases, however, reduction of the condensate extraction coefficients in the presence of a porous medium amounts to 15-20 percent as compared with data obtained in a PVT bomb not filled with the porous medium.

It has proven possible to determine the condensate extraction coefficient with consideration of the influence of the porous medium according to investigations of the formations of Western Turkmeniya with the formula [1]

$$K_c = K_{UGK} - K_s \quad (1)$$

where K_c is the condensate extraction coefficient, %; K_{UGK} is the condensate extraction coefficient determined with a UGK-3, %; K_s is a correction factor which takes into consideration the influence of the porous medium on K_c , %.

Here the specific surface of the porous medium is taken as its main characteristic. Processing of the experimental results permitted obtaining empirical formulas for the determination of K_s when the pressure in the stratum is reduced from the initial to 1 kg(force)/cm²:

$$K_s = \frac{s}{42 + 0.033s}; \quad s = \sqrt{\frac{m^3}{5k(1-m)^2}}, \quad (2)$$

where s is the specific surface of the porous medium, m^2/cm^3 ; m is the porosity coefficient (in fractions of unity); k is the permeability factor.

For example, the condensate extraction coefficients for the investigated formations were calculated on the basis of five objects of deposits of Western Turkmeniya (Table 2). The data of that table show that for three out of five formations a porous medium reduces the extraction coefficient by 10-12 percent. In the remaining two cases the correction amounts to 18-20 percent. It is obvious that such a quantity cannot be neglected.

Contemporary methods of laboratory investigations of gas condensate by means of the UGK-3 are therefore a first approximation to real stratum processes. Therefore it is advisable to conduct experiments in a PVT bomb filled with a porous medium simulating the stratum of a given deposit. It also is possible as a result of investigations with a UGK-3 without a porous medium to introduce a correction which takes into consideration the influence of the porous medium on the condensate coefficient.

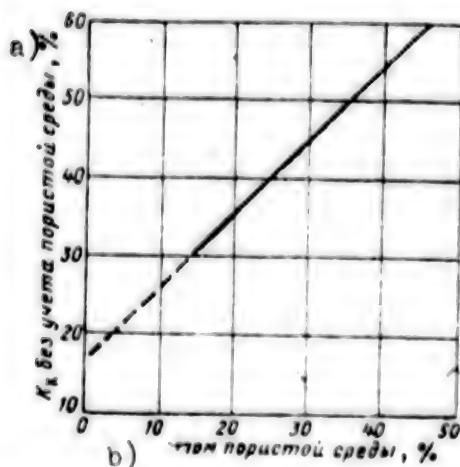


Figure 1. Interconnection of condensate extraction coefficients with and without consideration of the porous medium.

Key: a) without; b) with

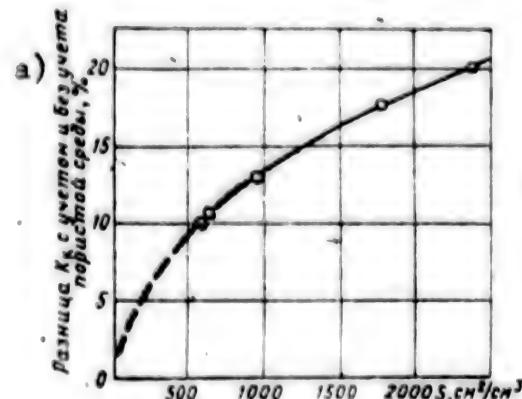


Figure 2. Dependence of the difference of condensate extraction coefficients with and without consideration of the porous medium on its specific surface.

Key: a) Difference of K with and without consideration of the porous medium, %

On the basis of the data presented in Table 2 graphs of the interconnection of the condensate extraction coefficients were constructed with and without consideration of the porous medium (Figure 1) and also the dependence of the difference of the condensate extraction coefficients with and without consideration of the porous medium on its specific surface (Figure 2). As is evident from Figure 2, with increase of the specific surface of

the porous medium there is increase of the difference of the condensate extraction coefficients with and without consideration of the influence of the porous medium.

The accumulated results of investigations conducted in recent years at the Turkmen Scientific Research Institute of Petroleum permit noting that experimental investigations which permit taking into account the influence of the porous medium on phase transformations, sorption processes in the development of gas condensate deposits and the influence of the mineralogical composition of collector rocks are important.

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UDC 622.279.1/.4.001.24

MODEL FOR PLANNING VOLUME OF GAS EXTRACTION

Monograph GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 80 pp 18-19

[Article by N. I. Bereshev and V. A. Stus', Ukhkinskiy Industrial Institute]

[Text] The proposed model permits forecasting the dynamics of annual gas withdrawals for the entire period of development of a formation with gaseous conditions.

On the basis of the dynamics of natural gas extraction of 26 formations of Komi ASSR, Krasnodarskiy and Stavropol'skiy krays, Central Asia and the Ukraine with gaseous working conditions, by analogy with [1,2] a statistical model (drawing or table) has been constructed of q^* (Q^*), where q^* is the share of the annual withdrawals (q) of the maximum extraction level (q_m) and Q^* is the share of accumulated (Q) of extractable reserves (Q_{ex}).

The selection of formations is fairly representative. The extractable gas reserves in the formations amounts to from 405 billion m^3 for the northern dome of the Buktyrskoye deposit to 0.017 billion m^3 for one stratum of the Nyamed'skoye deposit. The development time reaches 37 years for the Sed'nol'skoye deposit. In four formations (Voy-Vozhskoye strata I and III, the Sel'nol'skoye and Nyamed'skoye) development has been completed. The difference of accumulated yield of the model from the mathematical expectation is not more than 2 percent.

The model integrally takes into account distinctive features of the geology, operation and technical and economic conditions of optimum development. For prediction of the dynamics of annual withdrawals for the entire development period for the model, only the extractable reserves and the maximum level of extraction must be known.

The dynamic model of gas extraction can be calculated with a graphic method [1,2], but it is laborious and gives substantial errors, especially in the final stage of development.

We present an analytical calculation of a model for the dynamics of gas withdrawals. We introduce the symbols: t_1 and t_{1+1} -- the current and

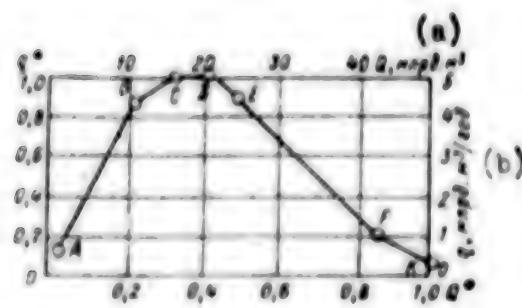
next year of development ($i = 1, 2, \dots, k$); q_i and q_{i+1} -- the annual withdrawals in the years t_i and t_{i+1} ; Q_i and Q_{i+1} -- the accumulated withdrawals of gas in t_i and t_{i+1} .

The calculation is made for each separate rectilinear section of the model in accordance with the drawing and table.

Table Values of characteristic points of the model of gas extraction for formations with gaseous conditions

Point	Q^*	q^*
A	q_1/Q_1 (1)	0.10
B	0.21	0.86
C	0.32	1.00
D	0.40	1.00
E	0.49	0.90
F	0.846	0.20
K	1.00	0.03

Key: (1) The mean value (0.015) cannot be used in the calculations because for separate formations it depends essentially on the maximum withdrawal rate.



Annual withdrawals as a function of the accumulated extraction of natural gas for formations with gaseous working conditions (upper and right scales are measurement scales for a hypothetical formation)
Key: a - Q , billion m^3
b - q , billion m^3 /year

Section AB is:

$$Q_{i+1} = \frac{0.21Q_i - q_i}{0.21Q_i - 0.86q_i} Q_i + q_i. \quad (1)$$

If the annual withdrawal in the first year of development is unknown, its estimated value can be found as the mathematical expectation. According to the table

$$q_1 = 0.1q_m. \quad (2)$$

Section BC is:

$$Q_{i+1} = \frac{q_i}{Q_i - 1.273q_m} (Q_i - 0.593q_m). \quad (3)$$

Section CD is:

$$Q_{i+1} = Q_i + q_i. \quad (4)$$

Section DE is:

$$Q_{i+1} = \frac{Q_i + 1.444q_m}{Q_n + 1.111q_m} Q_n. \quad (5)$$

Section EF is:

$$Q_{i+1} = \frac{Q_i + 1.88q_m}{Q_n + 2q_m} Q_n. \quad (6)$$

Section FK is:

$$Q_{i+1} = \frac{Q_i + 1.107q_m}{Q_n + 1.104q_m} Q_n. \quad (7)$$

The annual withdrawals are:

$$q_{i+1} = Q_{i+1} - Q_i. \quad (8)$$

Formulas (1) and (3-7) were obtained by simultaneous solution of the corresponding equation of the straight line with equation (8).

For the construction of a dimensional model of any natural gas formation with gaseous working conditions one should plot on the upper and right axes of a dimensionless model the scales Q_i and q_m in the right upper corner. This has been done on the figure for a hypothetical formation with $Q_1 = 50$ billion m^3 and a maximum gas withdrawal rate $t_m = 10$ percent ($q_m = 5$ billion m^3).

The dimensional model of a specific formation is a nomogram for estimation of the annual levels of extraction according to given values of accumulated withdrawals, and the reverse.

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GEORGIY IVANOVICH AZHOTKIN--SEVENTIETH BIRTHDAY CELEBRATED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 5, May 80 p 37

[Article]

[Text]



Georgiy Ivanovich Azhotkin, chief of the Development and Plans Section and deputy chief of the Geological Administration of the Ministry of the Gas Industry, has reached his 70th year of age.

There is hardly anyone in the gas sector who does not know this eminent geologist. And not because he has worked in the Ministry of the Gas Industry since the day it was organized, but because the main prospects of the extraction of gas and gas condensate in different regions of the country have been determined by him.

Georgiy Ivanovich Azhotkin started his work path in Baku after graduation from the Azerbaijan Red Banner Industrial Institute imeni Azizbakov as a drilling technician and was promoted to deputy chief geologist of the association. The geological service headed by him discovered large oil formations, including the white Surkhanskaya, which in the period of the Great Patriotic War was used instead of gasoline.

Georgiy Ivanovich gave several years of his life to the organization of oil matters abroad, in Romania, Austria and Mongolia, working as deputy chief of the technical section of the Administration of the Oil Industry GUEIMZ [not further identified].

In his time G. I. Azhotkin displayed initiative in the testing ahead of schedule of the first exploratory well in the Achak area in the Turkmen SSR. The results of the test laid the foundation for the opening up and mass drilling of that promising region.

Constantly analyzing the results of surveys, test industrial operation and development of gas and gas condensate deposits in various regions of the country, G. I. Azhotkin arrived at the conclusion that not only small but also large multistratum formations ought to be introduced into test industrial operation before the survey work was finished and the reserves were tabulated in the USSR State Commission for Reserves. This provided a number of regions with gas in large volumes.

Georgiy Ivanovich Azhotkin has done much work on the introduction of new and promising industrial-geophysical investigations and has extended enormous help in the introduction of simultaneous and separate exploitation of multistratum gas and gas condensate deposits. And today G. I. Azhotkin, as an experienced specialist and a man of high spiritual qualities, is doing everything possible for the development of the gas industry.

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FUELS

BRIEFS

OCEAN OIL 'BLOTTER'--Scientists at the Institute of Oceanology under the Academy of Sciences USSR have created a synthetic preparation capable of clearing oil patches covering large areas of ocean surface. Tests showed that the preparation can clear from the surface of the sea, within 15 minutes, oil patches on stretches of water measuring several thousands of square meters. Froth formed as the result of spraying the new preparation upon the film of oil can be pumped aboard ship and gathered up without any damage to the ocean's ecological system. According to specialists, up to 10 million tons of liquid fuel is dumped into oceans as the result of ship accidents and during the extraction of oil on ocean shelves. They claim that 100 liters of diesel fuel cast into the ocean forms a film (injurious to underwater vegetation and marine organisms) covering an area of 1 square kilometer. [Excerpt] [Riga SOVETSKAYA LATVIYA in Russian 28 Aug 80 p 2] 9643

NEW TURKMEN GAS CONDENSATE FIELD--Nebit-Dag, Turkmen SSR--Geological workers with the Kuydzhikskiy Exploratory Drilling Administration under the "Turkmenneft'" Association report completion of the first exploratory well at the new gas condensate field of Yuzhnoye Bugdali. Located in the Western portion of the Turkmen SSR, the new deposit is the 12th gas condensate field to be discovered in the area. Administration Chief Geologist K. Danchenko stated that the new well is already providing gas and that exploration of the field is being accelerated to assess its industrial reserves of gas and condensate. [Excerpt] [Moscow PRAVDA in Russian 20 Sep 80 p 1] 9643

TYUMEN' GAS REACHES NOVOSIBIRSK--Novosibirsk industrial enterprises located in the city's Dzherzhinskiy and Zayeltsovskiy rayons yesterday received their first gas from the Samotlor Field of Tyumenskaya Oblast. The deliveries signified completion and placement into operation of the Nizhnevartovsk-Yurga-Novosibirsk gas pipeline. Commenting on the event, Novosibirsk Gorkom Secretary Ye. V. Zolotov noted that the gas from Samotlor will enable local enterprises to cut back on costly shipments of coal from the Kuzbass, will free railroad transport facilities for other purposes, and will accelerate growth of the Siberian industrial base energy capacity. The forthcoming 11th Five-Year Plan will see such gas being provided to all Novosibirsk enterprises and to many of the oblast's cities. [Excerpt] [Moscow KOMSOMOL'SKAYA PRAVDA in Russian 27 Aug 80 p 1] 9643

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